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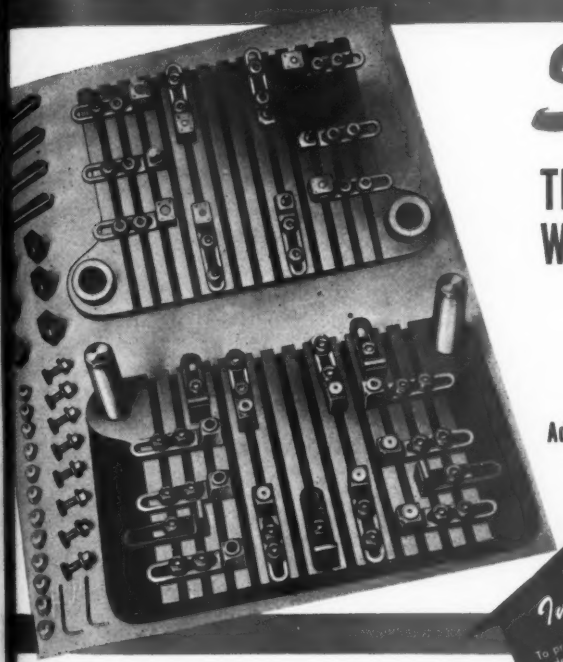
The Magazine of

TOOLING and PRODUCTION

APRIL · 1951

TOOL & DIE JOURNAL



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The Magazine of

TOOLING and PRODUCTION

TOOL & DIE JOURNAL

1975 LEE ROAD ● CLEVELAND 18, OHIO
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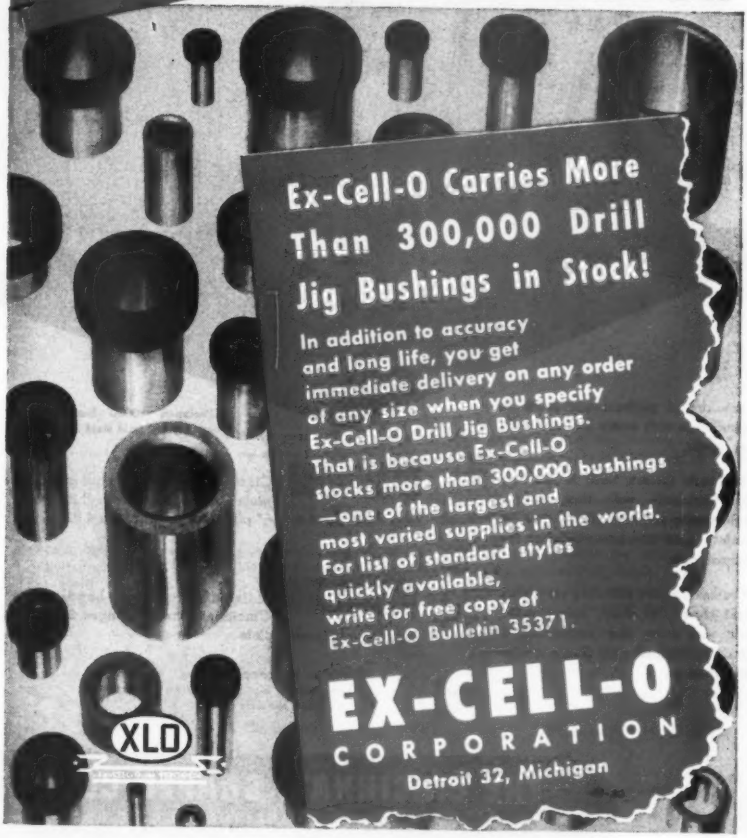

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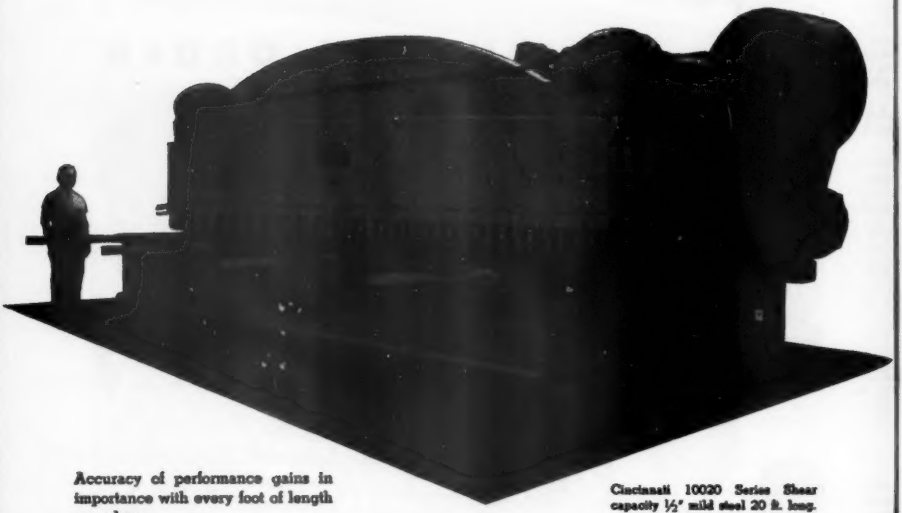

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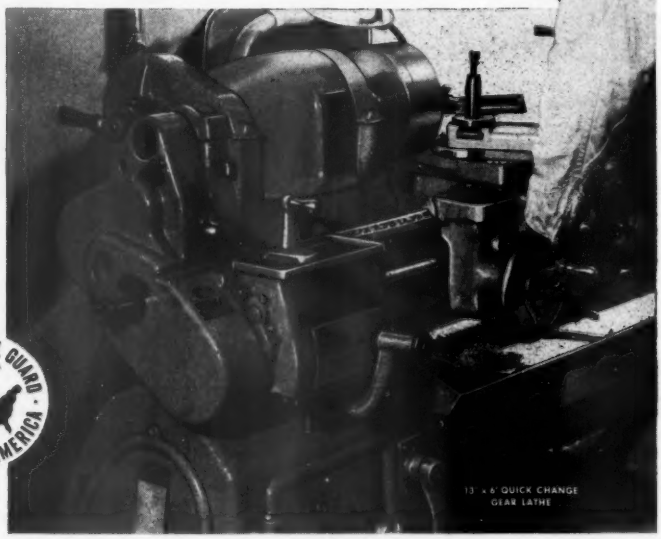

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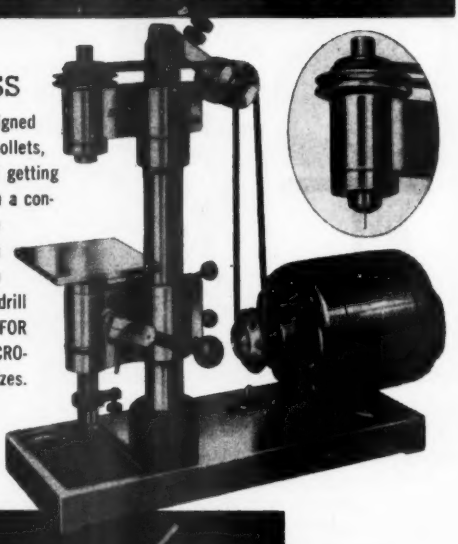

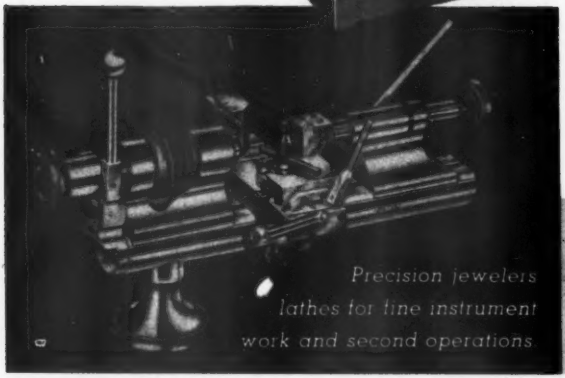

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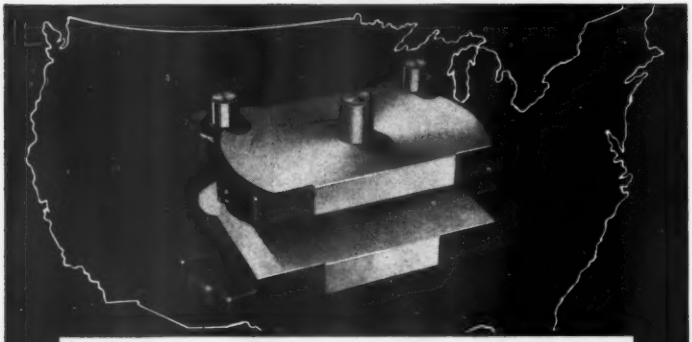

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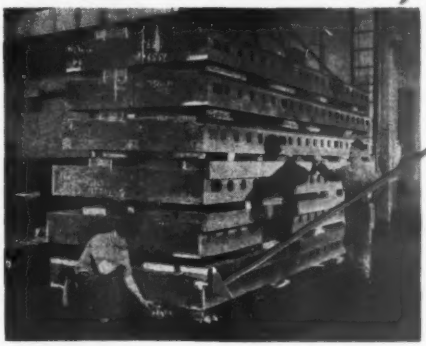

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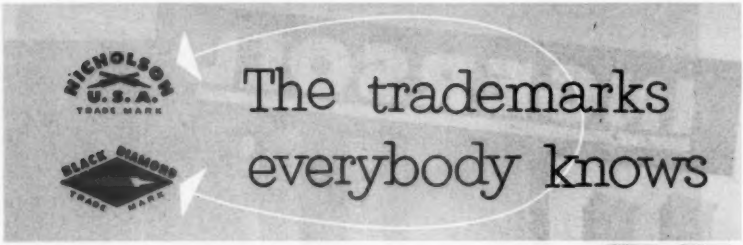

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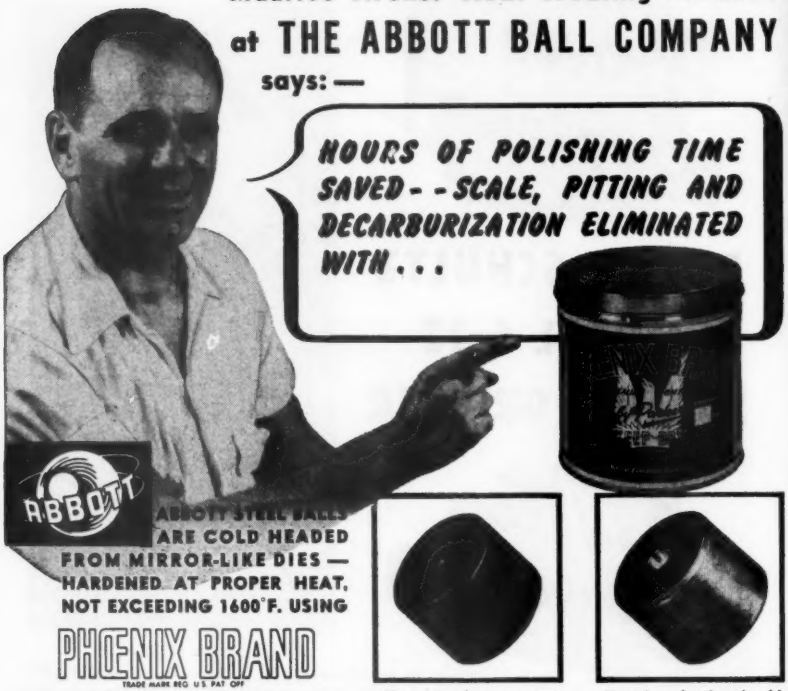
Maurice Tirone: Heat Treating Foreman at THE ABBOTT BALL COMPANY says: —


HOURS OF POLISHING TIME SAVED - - SCALE, PITTING AND DECARBURIZATION ELIMINATED WITH . . .
ABBOTT
ABBOTT STEEL BALLS ARE COLD HEADED FROM MIRROR-LIKE DIES — HARDENED AT PROPER HEAT, NOT EXCEEDING 1600°F. USING

PHOENIX BRAND
TRADE MARK REG U.S. PAT OFF

NON-SCALING COMPOUND

Above is shown a test cold heading, steel ball die after ordinary heat treating. Note surface discoloration, pitting and scale. Even after costly polishing operation, this die would probably be rejected.

Here is a hardened cold heading die Heat Treated with PHOENIX BRAND NON-SCALING COMPOUND. Note clear smooth scale-free surface. Saves TIME, saves money and of course better dies *last longer.*

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Phoenix Brand Compound is easy to use — it goes on dry — solves heat treating problems — virtually eliminates costly polishing.

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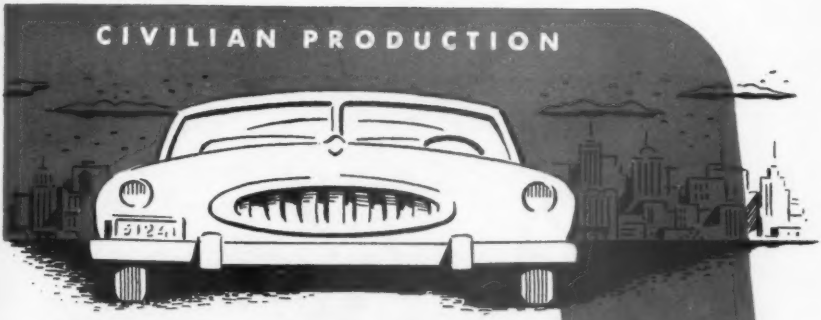


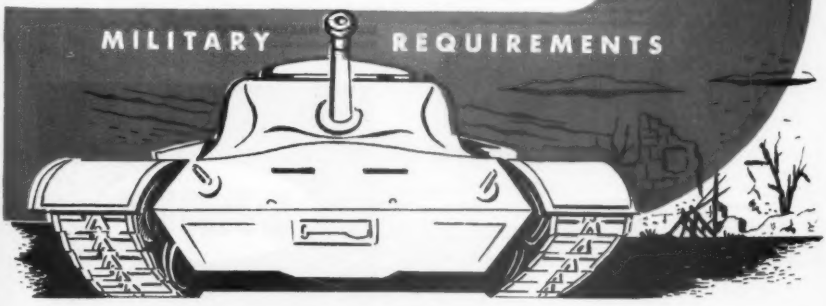
MEETING BOTH NEEDS AT QUALITY

IN the present emergency, Quality has taken the lead in adapting its facilities to the vital two-fold requirements of the nation. Quality is helping maintain high civilian production, our best insurance against inflation, by stepping up service to civilian customers. At the same time, however, we are helping to meet military requirements for the present defense effort by supplying vital tools and dies.

Thus by increased utilization of our existing facilities we are producing for our civilian customers at nearly full peacetime capacity even though assuming the responsibility of an active role in the preparation for national defense.

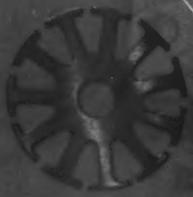
- METAL STAMPINGS
- COMPLETE ASSEMBLIES
- TOOLS AND DIES
- JIGS AND FIXTURES

QUALITY HARDWARE AND MACHINE DIV.
Continental Copper and Steel Industries, Inc.
5847 No. Ravenswood Ave., Chicago 26, Ill.



SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS

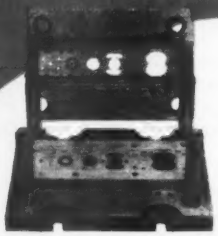
160 pieces a minute to tolerances of less than .0005"!



These rotor and stator elements are stamped in the six station die shown below in a 30-ton press at 80 strokes per minute. With half thousandth piece part tolerances, almost perfect die alignment is a must! That's why . . .

they built the die in a

DANLY PRECISION DIE SET



Die built by the Sherman Tool & Die Co., Charlestown, Massachusetts, for the Signal Manufacturing Co., Lynn, Massachusetts, in a Special Danly Precision Die Set!

PRECISION DIE SETS . . . STANDARD AND SPECIAL

Danly precision makes every Danly Die Set a reliable base for the finest die work. They save time in the die shop because they are square and true . . . they assure longer production runs in the press because precision closure protects die components.

Standard Danly Die Sets are quickly available from a nationwide system of completely stocked assembly branches. Just phone for fast delivery, and for the finest in die set precision, always specify Danly.

DANLY MACHINE SPECIALTIES, INC.
2100 South 52nd Avenue Chicago 50, Illinois

HARDINGE
ELMIRA, N.Y.
TOOLING
ACCESSORIES
Make sure you have the latest HARDINGE Bulletins which give all performance features, price savings, and ordering information.
Check the squares below for Bulletins desired, fill in your name and address, and mail to HARDINGE BROTHERS, INC.
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Cleveland Cone National Acme
New Britain Bardons & Oliver Gridley Acme-Gridley
Gishalt Jones & Lamson Warner & Swasey
☐ Master Collets and Pads
Cleveland Cone National Acme
New Britain Gridley and Acme-Gridley
☐ Master Feed Fingers and Pads
Cleveland Cone Davenport National Acme
New Britain Gridley and Acme-Gridley
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Company _____
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City _____ Zone _____ State _____

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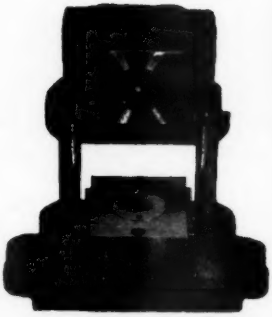
"A MUST wherever WASHERS are made!"

HOVIS

OFFERS YOU THIS SIMPLE, UP-TO-THE-MINUTE METHOD

There's no need to make a complete new Die for any type washer or blank. The HOVIS UNIVERSAL WASHER DIES provide a Master Holder and by merely changing 5 SMALL, EASILY REMOVABLE PARTS the new washer or blank is produced . . . Special sets of parts are available for use in Master Washer Units enabling customers to produce irregularly shaped pieces and shallow draws. Multi-Washer Dies are also designed and manufactured.



Made in 5 sizes:
¾"—1½"—2½"—4"—6".

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8100 E. NINE MILE ROAD — **Phone: Slocum 7-1334**

VAN DYKE, MICHIGAN — **Suburb of Detroit**

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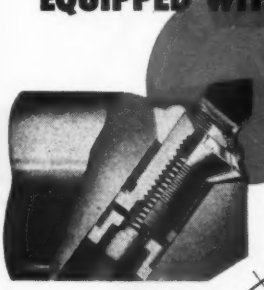
MICROBORE
by DeVlieg

Special Boring Bars

FOR PRECISION WORK

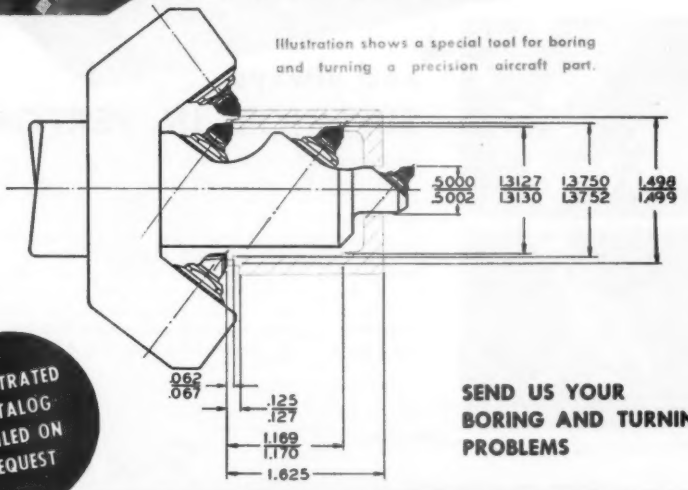
EQUIPPED WITH STANDARD MICROBORE TOOLS



- BORING
- TURNING
- FACING

Each tool independently adjusted by proven micrometer, vernier principle.

Illustration shows a special tool for boring and turning a precision aircraft part.



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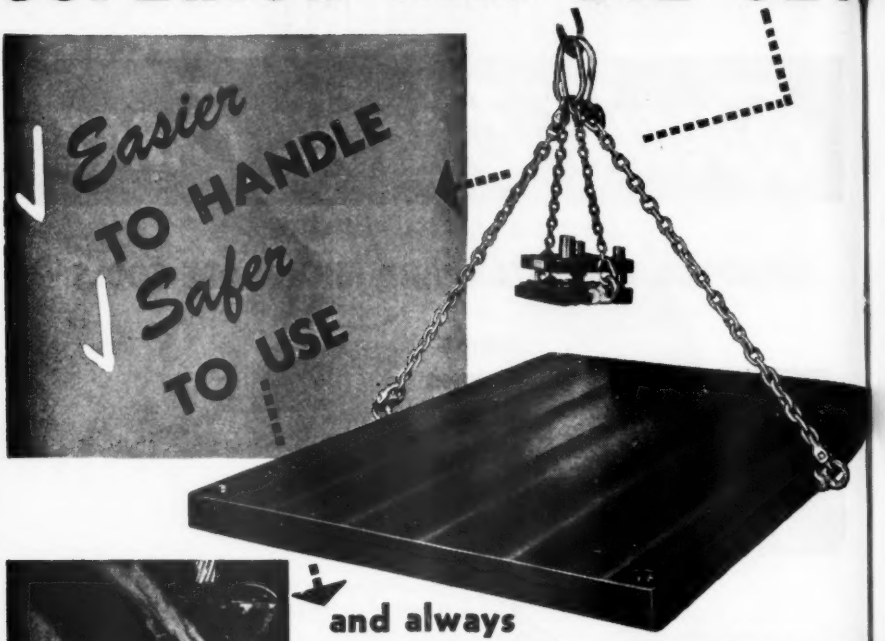
SEND US YOUR BORING AND TURNING PROBLEMS

DeVLIEG MICROBORE COMPANY
400 FAIR AVENUE • FERNDALE 20, MICHIGAN, U.S.A.

SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS

SUPERIOR *ALL-STEEL* DIE SET



and always SUPERIOR IN PERFORMANC

Superior All Steel Die Sets have Exclusive Design Features t make them the No. 1 Set in the field today. Superior's Lock-I Lifting Device and E-Z Lift Sling Chain makes it possible move Superior Die Sets of any size or weight . . . for any distan in any direction (illustration above). Superior's Safety Fla safeguards against crushed fingers . . . acts as a connecting l between die set proper and lifting device (illustration left). S perior All Steel Die Sets are carefully processed to meet indivi job specifications . . . your guarantee of the finest in performan Yes, with Superior you get a **Superior Die Set,** in Less Time, No Greater Cost. Investigate Superior All Steel Die Sets, Too

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2438 Franklin Ave.,
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MR. ANDREW C. GRAHAM,
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Free CATALOG

with complete information on Superior All Steel Die Sets and Equipment will be sent to you upon request. Write for your copy of Bulletin No. 850 today.

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Defense Contracts

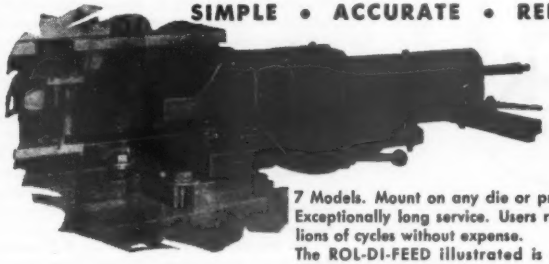
CALL FOR SPEED AND PRODUCTION!

DICKERMAN AUTOMATIC

PUNCH PRESS FEEDS

Increase Production to 500%

SIMPLE • ACCURATE • RELIABLE



7 Models. Mount on any die or press. Exceptionally long service. Users report millions of cycles without expense. The ROL-DI-FEED illustrated is especially adapted to feeding strip.

•INCREASE YOUR PRODUCTION WITHOUT INCREASING YOUR MANPOWER.

NO ALLOCATIONS OR RESTRICTIONS

Available from dealer stocks right now!

You can handle larger contracts now with your present plant and with no increase in employees. Take advantage of the phenomenal production increases afforded by Automatic Punch Press Feeds. Write today for details.

H. E. DICKERMAN Manufacturing Co.

323-421 ALBANY STREET, SPRINGFIELD, MASS.

SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS

Here's help for Housewives..

P-K
TRADE MARK
REG. U.S. PAT. OFF.

According to worker supply forecasts, your assembly lines will soon be "manned" by more and more housewives.

Whether housewives or not, any "green hands" on Socket Screw assembly jobs will learn faster and work faster with P-K* Size-Marked Gear Grip Socket Head Cap Screws.

The clearly readable Size-Mark prevents confusion and errors—saves a lot of lost motion. It's a help in the tool crib, too, where left-over, mixed screws can be easily sorted. And the Gear Grip means non-slip starting, speeds the job.

No wonder these time-saving, top quality Socket Screws are wanted, in tremendous quantities, for more of industry's finest products than ever before. P-K production is going 'round-the-clock to meet this mounting demand. For D.O. or other assemblies set your standards by P-K quality. Parker-Kalon Corporation, 200 Varick Street, New York 14, N. Y. Sold through Accredited Distributors.

MORE HELP FOR ASSEMBLY PLANNERS

The New
P-K Socket Screw Dimension Finder

A pocket-size plastic slide chart gives you all essential dimensions of P-K Socket Cap Screws, Set Screws, Flat Head Screws, Stripper Bolts, and Pipe Plugs. Includes Set Screw Point Dimensions, and Thread Length Formula. Available, FREE from your P-K Distributor.

PARKER-KALON*
cold-forged
SOCKET SCREWS

SIZE-MARKED SOCKET HEAD CAP SCREWS • GROUND THREAD SOCKET SET SCREWS
FLAT HEAD SOCKET CAP SCREWS • STRIPPER BOLTS • PIPE PLUGS • HEX KEYS
* TRADE MARKS REG. U.S. PAT. OFF.

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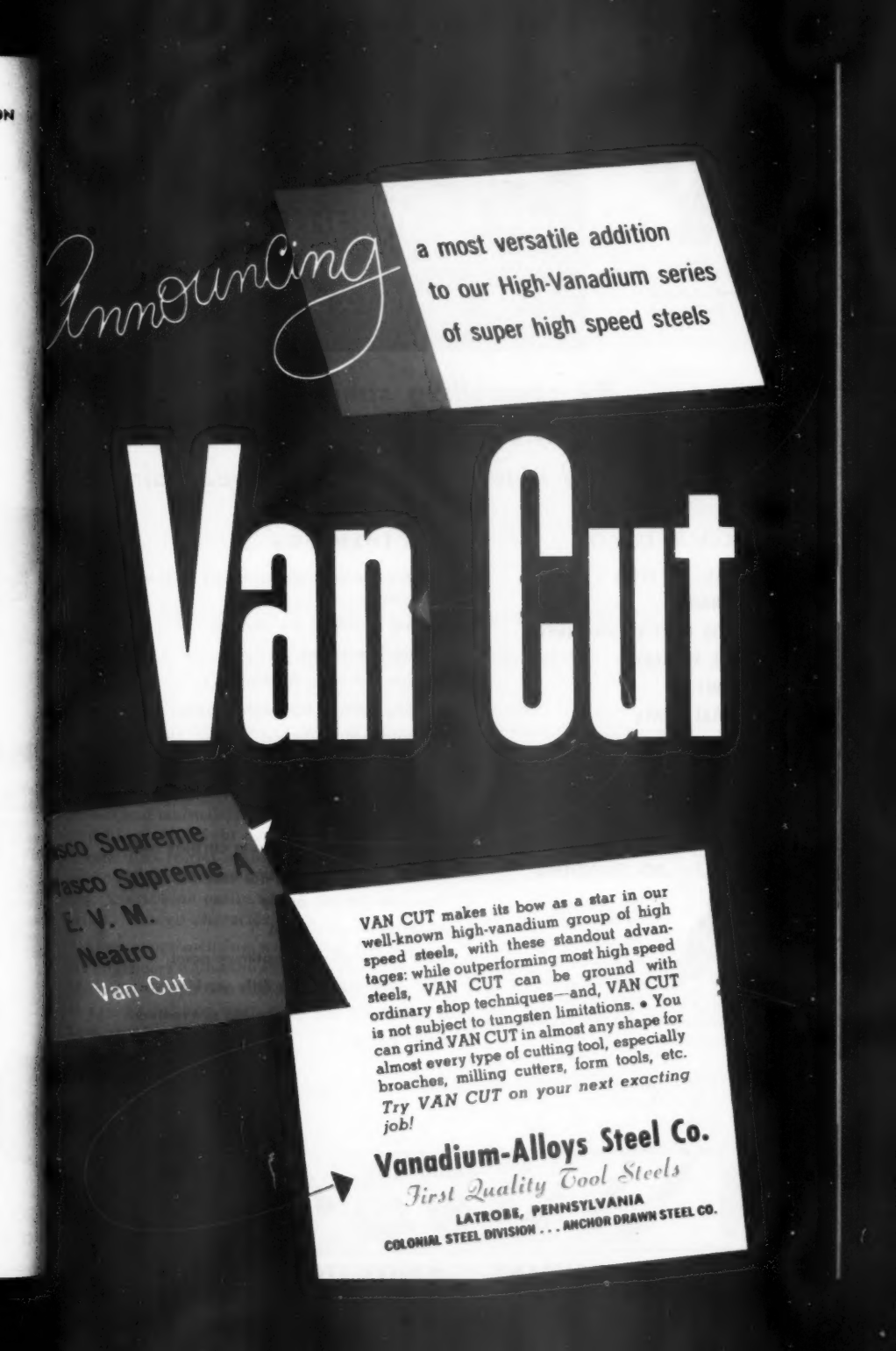
Announcing
a most versatile addition
to our High-Vanadium series
of super high speed steels
Van Cut
sco Supreme
Vasco Supreme A
E. V. M.
Neatro
Van Cut
VAN CUT makes its bow as a star in our well-known high-vanadium group of high speed steels, with these standout advantages: while outperforming most high speed steels, VAN CUT can be ground with ordinary shop techniques—and, VAN CUT is not subject to tungsten limitations. • You can grind VAN CUT in almost any shape for almost every type of cutting tool, especially broaches, milling cutters, form tools, etc.
Try VAN CUT on your next exacting job!
Vanadium-Alloys Steel Co.
First Quality Tool Steels
LATROBE, PENNSYLVANIA
COLONIAL STEEL DIVISION . . . ANCHOR DRAWN STEEL CO.

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P-K
TRADE MARK
REG. U.S. PAT. OFF.

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PARKER-KALON*
cold-forged
SOCKET SCREWS

SIZE-MARKED SOCKET HEAD CAP SCREWS • GROUND THREAD SOCKET SET SCREWS
FLAT HEAD SOCKET CAP SCREWS • STRIPPER BOLTS • PIPE PLUGS • HEX KEYS
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Announcing

a most versatile addition
to our High-Vanadium series
of super high speed steels

Van Cut

sco Supreme
Vasco Supreme A
E. V. M.
Neatro
Van Cut

VAN CUT makes its bow as a star in our well-known high-vanadium group of high speed steels, with these standout advantages: while outperforming most high speed steels, VAN CUT can be ground with ordinary shop techniques—and, VAN CUT is not subject to tungsten limitations. • You can grind VAN CUT in almost any shape for almost every type of cutting tool, especially broaches, milling cutters, form tools, etc. *Try VAN CUT on your next exacting job!*

Vanadium-Alloys Steel Co.

First Quality Tool Steels

LATROBE, PENNSYLVANIA

COLONIAL STEEL DIVISION . . . ANCHOR DRAWN STEEL CO.

Ball Bearings preloaded with Vulcan special fixtures

new Vulcanaire spindles

FOR ALL HIGH SPEED, HIGH PRECISION GRINDING — INFINITE SPEEDS CONTROLLED FROM 30,000 TO 65,000 R. P. M.

By controlling speed at ANY point yo ELIMINATE need for a variety of type and kinds of constant speed spindles.

NOW IN USE ON

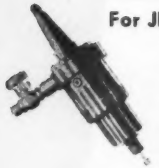
MILLS—ALL TYPES
GRINDERS
WOOD ROUTING MACHINES
GEAR SHAPERS
LATHES
RADIAL DRILLS
PANTOGRAPH MACHINES
SPECIAL MACHINES

USE THEM FOR

* finishing contours on hardened steel working surfaces
* burring or milling die castings
* routing wood contours
* carbide milling or finishing slots
* finishing holes in hardened steel to "tenths"
* grinding with diamond wheels, carbide burrs, or impregnated diamond mandrels.

ADVANTAGES

√ 10 micro inch finishes using carbide mills
√ 6 micro inch finishes using mounted points
√ Operates at any angle
√ Air driven—air cooled
√ Speed controlled at optimum point
√ 3 5/16" long motor uses little working space
√ Overheating and expansion prevented
√ Easily adapted



For JIG GRINDING

ask for literature on Vulcanaire, Jig Grinder, the now famous 65,000 R.P.M. attachment for jig borers or mills. Be sure to mention machine tool application.

For SPINDLE information ask for Vulcanaire Spindle literature and quote. Be sure to mention machine tool application and type of production.

VULCAN TOOL COMPANY • PRITZ STREET • DAYTON OHI

How GRAPH-MO steel made a micrometer measure up

THE extreme accuracy of this V-notch Adjustable Micrometer made by the Lester Micrometer Company, Cleveland, Ohio, depends on the precise spacing of the V-notches. Finding a steel that would permit and maintain this precision posed a problem. The right steel would have to: 1. retain its initial accuracy for years, 2. give minimum distortion from heat treating, 3. machine easily and 4. assure excellent welded characteristics.

After experimenting with other steels, the engineers found the answer in Graph-Mo steel. Graph-Mo did not change size in aging, did not warp or crack during heat treating, machined easily and allowed ductile welds that did not develop cracks under shock loading.

Because Graph-Mo contains free graphite, it machines fast and easily, hardens uniformly with minimum distortion and gives an extremely fine finish. And due to diamond-hard carbides in the structure, it offers unusually stubborn resistance to wear and abrasion.

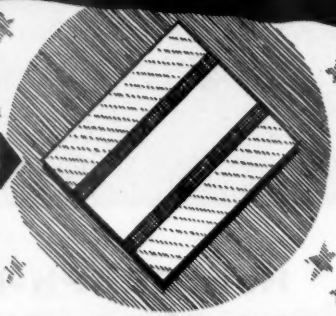
Graph-Mo is one of four Timken® graphitic tool steels widely used in gauges, dies, machine parts and other applications. For further information, write for the enlarged 9th edition of the Timken Graphitic Steel Data Book. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

TIMKEN
Fine Alloy
STEEL
and Seamless Tubes

SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS

MORE WAYS TO SAVE by using Revere Bushing Cores

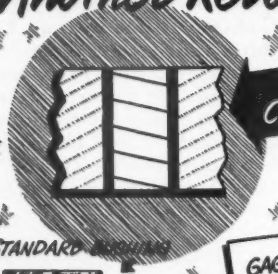
THE STANDARD S.P.L. BUSHING WITH A SOFT STEEL OVERSIZE BODY TO BE TURNED BY CUSTOMER FOR A QUICK REPLACEMENT OF SPECIAL BUSHINGS



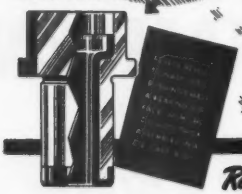
THIN WALL BUSHING ★ HARD WEARING SURFACE

Another Revolutionary Feature!

FLEXIBLE HOLE SIZE CONTROLLED BY YOUR BORING SIZE



STANDARD BUSHING



GAGE H.C. WEARING SURFACE ON SOFT STEEL SHANK

ARBORS: New or Salvage

Revere Fisher ENGINEERING COMPANY
NORTH BRANCH, MICHIGAN

WE ARE READY!

Defense production calls for *precision*—and precision points directly to PRATT & WHITNEY.

P&W Precision has spurred production through four major wars since 1860. It is invaluable today in all Plants, including those of Sub-Contractors. Parts machined and gaged with P&W precision on the home grounds, and in widely separated plants, *fit accurately*.

Right now our huge, completely equipped plant is well primed for *any* emergency. Our experienced engineers and craftsmen are thoroughly trained in the P&W tradition for precision. Know-how, skill and accuracy are reflected in all the equipment they build—P&W *Precision* Machine Tools, Cutting Tools and Gages.

With them, you'll take stepped-up defense production quotas in stride.

PRATT & WHITNEY PRECISION

Call any nearby P&W Branch Office at

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- Vertical Shapers
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- Automatic Lathes
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- Die Sinkers
- Automatic Duplicating Machines
- Keller Machines
- Cutter Grinders
- Vertical Surface Grinders
- Die Grinders
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- Kellerflex Flexible Shaft Machines
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CUTTING TOOLS

- Taps (all types)
- Dies (all types)
- Milling Cutters
- Thread Milling Cutters
- Reamers (all types)
- End mills
- Form Cutters
- Die Sinking Cutters
- Keller Cutters and Tracers
- Cut-Off Blades
- Drills
- Solid Carbide and Carbide Tipped Tools
- Precision Screw Plates
- Kellerflex Steel and Carbide Burs
- Metal Slitting Saws

..AND GAGES

- Cylindrical Gages
- Thread Gages
- Pipe Thread Gages
- Plain Snap Gages
- J-S Roll Thread Snap Gages
- A. P. I. Gages
- Hoke and USA Precision Gage Blocks
- Supermicrometers
- Standard Measuring Machines
- Electrolimit Comparators
- Air-O-Limit Comparators
- Tri-Roll Thread Comparators
- Continuous Gages
- Multiple Station Gages
- Special Gages

PRATT & WHITNEY
Division Niles-Bement-Pond Company
WEST HARTFORD 1, CONNECTICUT

Symbol of Accuracy
SINCE 1860

Break BOTTLENECKS On Tool Delivery

With Low Cost High-Output DUMORE Quill Set-ups

Typical quill holding fixture used by The Buda Co., Harvey, Illinois

As deliveries of machine tools slow, even on D. O. orders, many production minded engineers are turning to Dumore quills to beat the tool shortage. By combining these precision-built quills with plant designed fixtures they get grinding, drilling, or light milling production *right now* . . . at highly satisfactory rates . . . at a fraction of the cost of unobtainable special-purpose machines.

Here's How it Works

Basically, most set-ups consist of quill, holding fixture, chucking device, and belt drive from either motor or overhead. Set-ups may be mounted on bench, used-machine base, or in specially designed housings to permit more complicated series operations.

For complete information on the use of Dumore quills as high-production workheads call your Dumore Distributor. Free catalog on request to:

THE DUMORE COMPANY

Dept. D-42 **Racine, Wisconsin**

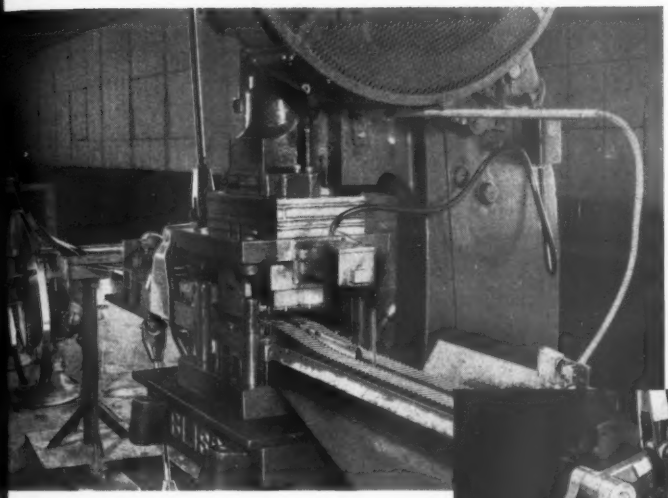
Export Address: **13 East 40th Street, New York 16, N. Y., U.S.A.**

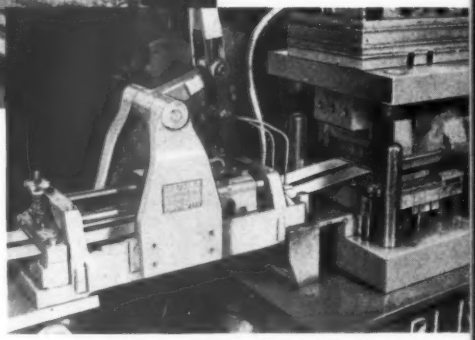
DQ1

Want to Increase Press Output?

HERE'S AN IDEA . . .

You can use a U. S. Slide Feed to feed from more than one coil at the same time.





In order to increase production, the Kold-Hold Company of Lansing, Michigan, equipped one of their conventional presses with a U. S. Slide Feed to feed two strips simultaneously. The set-up, using two U. S. Automatic Stock Reels and the U. S. Slide Feed, is shown in the photographs above. The die into which the stock is being progressed is of complicated design; consequently, controlled accuracy of feed length or pitch *is a must* for successful operation. For this reason, a U. S. Slide Feed was selected.

CONTROLLED ACCURACY PLUS VERSATILITY

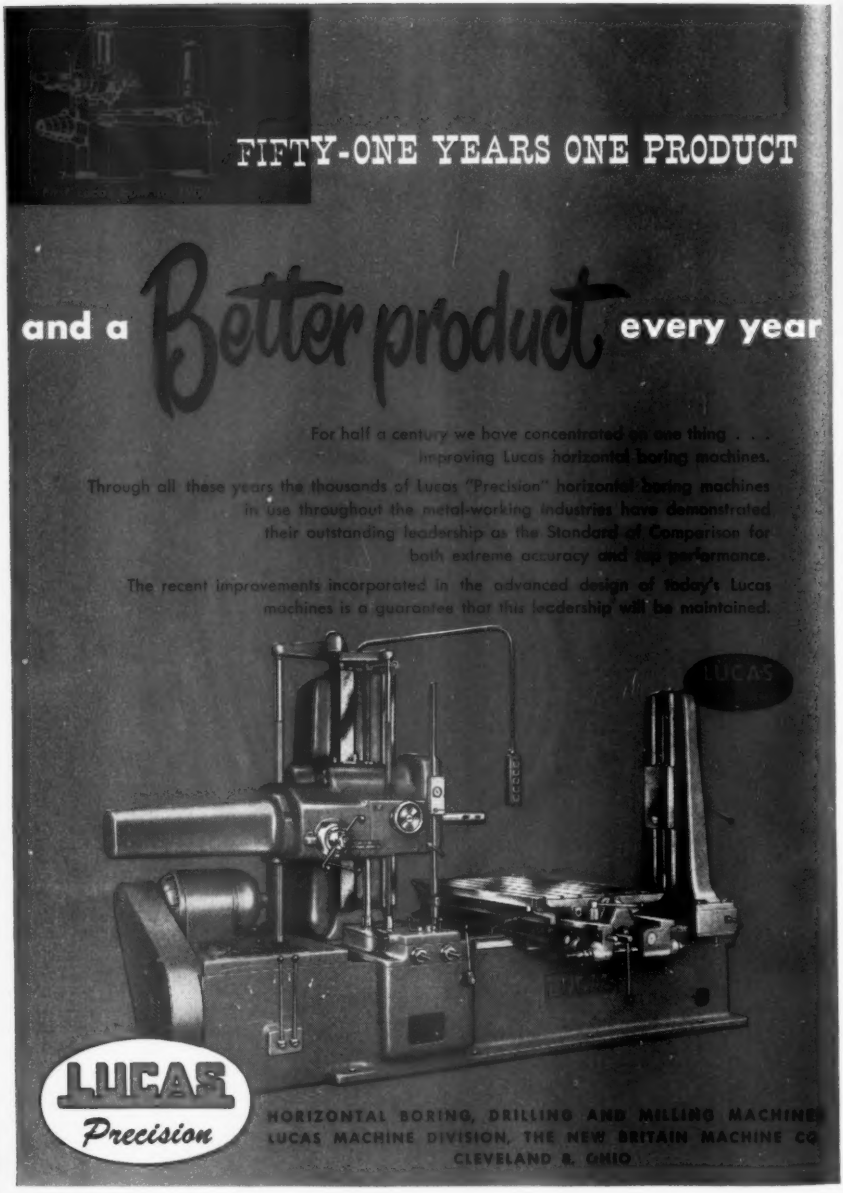
These are two of the features of U. S. Slide Feeds. *Accuracy*—Pitch or feed length can be controlled between definite stops, and is uniformly maintained stroke after stroke in continuous feeding, in many cases to within .001 inch. *Versatility*—Stock can be fed in single strips, or in multiples as illustrated. Practically any type of material—flat stock, round wire, irregular cross-sections, in metal, cardboard, wire-cloth, etc. — can be handled.

If you want to increase press output on jobs that call for accurate feeding, investigate the possibilities of U. S. Slide Feeds. Ask for a copy of Bulletin 80-T, which contains complete specifications, and shows how U. S. Automatic Press Room Equipment can be used to convert conventional presses into highly efficient automatic machines.

U. S. Tool Company, Inc.

AMPERE (East Orange) NEW JERSEY

Builders of U. S. Multi-Slides — U. S. Multi-Millers
U. S. Automatic Press Room Equipment
U. S. Die Sets and Accessories


FIFTY-ONE YEARS ONE PRODUCT
and a Better product every year
For half a century we have concentrated on one thing . . . improving Lucas horizontal boring machines.
Through all these years the thousands of Lucas "Precision" horizontal boring machines in use throughout the metal-working industries have demonstrated their outstanding leadership as the Standard of Comparison for both extreme accuracy and top performance.
The recent improvements incorporated in the advanced design of today's Lucas machines is a guarantee that this leadership will be maintained.
LUCAS
LUCAS Precision
HORIZONTAL BORING, DRILLING AND MILLING MACHINES
LUCAS MACHINE DIVISION, THE NEW BRITAIN MACHINE CO.
CLEVELAND 8, OHIO

PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION

If you take several operations to trim drawn shells, whatever their shape, you are paying too much for them. The Brehm Trimming Die—the "shimmy" die—makes a one-punch job out of hundreds of trimming tasks that would otherwise require several operations. Take notching, for example—

The parts shown above have irregular edges, some notched. Nevertheless, they were notched and trimmed in one operation, in **one press stroke**, with a Brehm Die. Costly, time-consuming, multiple trimming operations were eliminated.

The Brehm Die gives you better shells, too. Edges of full metal thickness—sharp, clean, flat, without burrs or draw marks. Can be used with almost any material: stainless and mild steel, copper, brass, zinc, aluminum, gold, silver, fiber, rubber and plastics.

Stock thickness makes no difference. Users of Brehm Dies have trimmed shells of .008 brass to .218 steel. Shapes or sizes make no difference: straight, curved, or notched edge contours, with sharp angles or projections. Shells small as the case of a lady's watch, large as the largest refrigerator doors. ***Submit your blueprint or shell for full information.***

THE "SHIMMY" REG. DIE

Write today for full details and a free copy of the Brehm Trimming Die Catalog.

THE STEEL PRODUCTS ENGINEERING CO.
Brehm Die Division, 1238 W. Columbia Street, Springfield, Ohio

Gentlemen: Please send me a copy of the Brehm Die Catalog.

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

THE STEEL PRODUCTS ENGINEERING CO.

BREHM DIE DIVISION • SPRINGFIELD, OHIO

SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS

"Savings have ranged from 33% on 1/16" stock to 75% on 5/16" stock (dead soft). These percentages apply to limited production quantities of from 25 to 200 units."

"This machine has now been in operation for approximately eight months in the fabrication of a wide variety of sheet metal parts where production volume is relatively low, that is to approximately 200 pieces per run. Outstanding savings in production time have been accomplished compared to other methods."

"We have been able to make substantial savings in the production time of our parts over previous methods of fabricating."

"One example was the production of 200 brackets 5-3/4"x 2-1/2" using 11 gauge mild steel sheet. This job required punching 7 round holes ranging from 1/8" dia. to 3/4 dia., plus nibbling two radius slots 7/32" wide and 1-1/4" long. Total Wales Fabricator time was .01757 hours per piece, or a total of 3.474 hours for 200 pieces plus 1.167 hours setup time. Total saving on 200 piece was 116 hours. These figures are taken from actual time studies on record."

REORDERS

. . . PROOF THAT USERS ARE REALLY CUTTING COSTS WITH

WALES Fabricators

● Repeat orders prove the **axiom**—"It's not what we say but what users say that counts." Yes, repeat orders are the most concrete evidence of customer enthusiasm for Wales Fabricators wherever limited runs do not justify expensive, single purpose dies for *punching, notching* or *nibbling.*

This revolutionary Wales Fabricator with ram that actuates up to 165 strokes per minute and with Wales patented "Quick Change" System makes possible *startling,* "never-heard-of-before" time study figures. *SEE STATEMENTS AT LEFT.*

Write TODAY for packet of time studied parts and fully-illustrated, functionally-colored Catalog 10-A.

WALES-STRIPPIT CORPORATION

George F. Wales, Chairman

355 PAYNE AVE., NORTH TONAWANDA, N.Y.

(Between Buffalo and Niagara Falls)

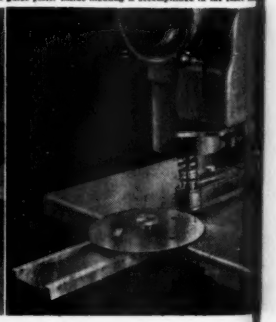
Wales-Strippit of Canada Ltd., Hamilton, Ontario

Specialists in Punching and Notching Equipment

PUNCHING . . . Illustrating Wales Fabricator punching holes in part. Note adjustable fingers for quick gauging of the work.

NOTCHING . . . Illustrating a Wales Notching Unit in operation in the Wales Fabricator.

NIBBLING . . . Showing the Wales Fabricator nibbling around the of guide plate. Inside nibbling is accomplished in the same



Tiny holes? . . . . . Easy!

Accurate holes? . . . . . Easy!

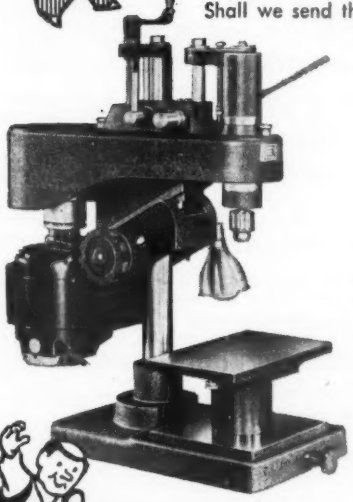
Holes on production schedules? . . . . . Easy!

***Tiny, accurate* holes on *production schedules?* . . . WOW!**

Hamilton Drilling Machines can do it!
And withdraw the drill undamaged
from hole after hole after hole!

LEARN HOW!

Write for the series of Hamilton Drilling Machine Bulletins and Price Lists.
(There is also a companion Tapping Machine.
Shall we send that bulletin along with the others?)



Shown here is the Hamilton Varimatic, Super Sensitive, Variable Speed, Small Hole Drilling Machine, one of four models, each particularly adapted to the work for which intended, all equally precise.

THE *Hamilton* TOOL COMPANY

832 SO. NINTH STREET • HAMILTON • OHIO • U • S • A

SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS

OVER 40 YEARS OF FINE TOOLS

SIEWEK

• DRILL JIGS
• FIXTURE CLAMPS
• FIXTURE DETAILS

YOU CAN'T CUT COSTS... USING COPIES...

Type "B"

Type "C"

Type "E"

Type "H"

STANDARDIZE and ECONOMIZE
SPECIFY "SIEWEK"

THE ORIGINAL and MOST COMPLETE LINE OF STANDARD DRILL JIGS, CLAMPS and FIXTURE DETAILS. THERE'S A STANDARD SIEWEK SIZE FOR EVERY JOB.

SIEWEK SPECIALIZES:

Siewek is the *only* manufacturer of a complete line of Drill Jigs both Spring and Rack and Pinion type—Fixture Clamps, Fixture Details.

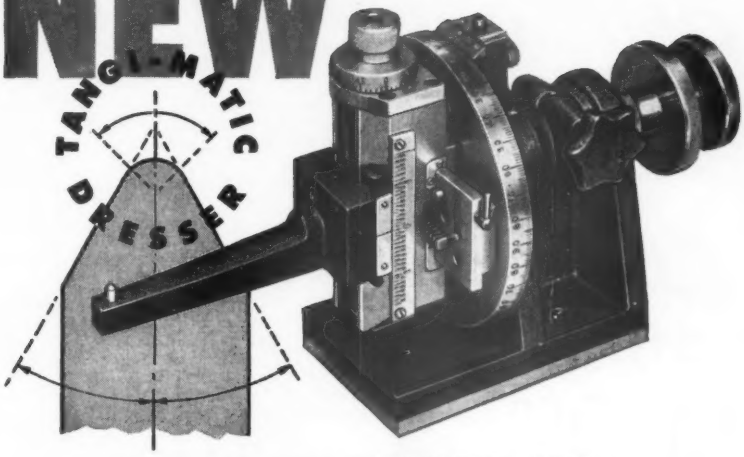
SPECIAL for TOOL DESIGNERS

Full size Template sheets for Drill Jigs now available. Request on Company stationery.

SIEWEK TOOL COMPANY

2860 East Grand Blvd. Detroit 2, Mich.

NEW TANGI-MATIC DRESSER



can save you HOURS daily

Now you can set up for dressing *any* grinding wheel form in *one-fourth the time*—and with precision to "tenths!" Our new TANGI-MATIC has a direct-reading micrometer *built in*—no "mikes," no height gage, no Jo Blocks—no errors. To dress any angle tangent to radius, you turn the micrometer dial and the vernier scale to "zero," adjust the diamond to the Master Gauge we furnish, then lock diamond with set screw. To obtain any radius down to .032", full 180°, you operate as a "mike," the feature which made our RADI-MATIC Radius Dresser famous.

The Perfex TANGI-MATIC is made by master gagemakers who specialize in gages and other precision instruments. All wearing parts are of steel, hardened, ground and lapped for a long life of precision service. The lead screw is hardened and ground to extremely close tolerances. Carrying case furnished for TANGI-MATIC and Master Setting Gage. Write for literature. And for all thread, plug and ring gage requirements, remember the Perfex reputation.

PERFEX GAGE & TOOL COMPANY

321 Avery Street • Mt. Clemens, Mich.

SOME TERRITORIES OPEN TO QUALIFIED REPRESENTATIVES

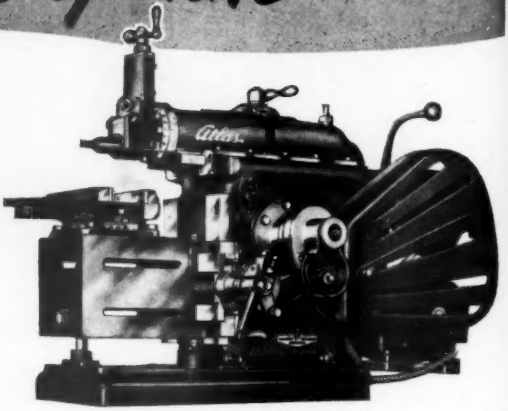
SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS

Built Better-Costs Less Easier to Operate—

Atlas 7" SHAPER

$410.00

LESS MOTOR F.O.B. KALAMAZOO
(PRICE SUBJECT TO CHANGE
WITHOUT NOTICE)



- ★ Handles all Shaping Within 7" Stroke
- ★ Timken Tapered Roller Bearings
- ★ Four Speeds
- ★ Five Feeds
- ★ Crank-Type Ram Drive
- ★ Extra-Heavy Construction
- ★ Requires Only ½ HP Motor

Engineers, shop owners, tool room foremen, maintenance men have been enthusiastic users of the Atlas shaper for years. No other small shaper even comes close to including all of its outstanding features. Set-ups are easier . . . exterior stroke adjustment . . . semi-steel iron bull gear with 1" face . . . *Timken tapered roller bearings on bull gear and pinion shaft — only the Atlas has such bearings!* There are 4 speeds, 5 automatic cross feeds, V-belt drive. Operates from ½ HP motor, belt guard furnished.

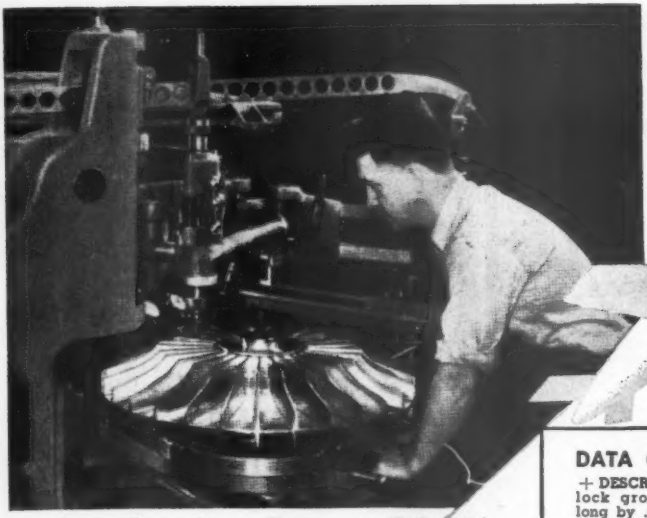
Compare all those features plus its extra-heavy construction, precision-ground ram ways, large bearing surfaces, and *price* — and you'll see why the Atlas is your best investment. Ask your Atlas dealer or send for catalog.

FREE METALWORKING CATALOG SEND FOR YOUR COPY

ATLAS PRESS CO.
484 N. PITCHER ST., KALAMAZOO, MICH.

MATCHED PRECISION TOOLS FOR WOODWORKING AND METALWORKING

PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION



One application of the pantograph machine among hundreds throughout industry.

Production Zooms 500%
on Aircraft Engine Parts

With Gorton pantographs and die and mold duplicators, you increase production, lower costs and do more accurate profiling, routing, die sinking, mold cutting, counterboring, chamfering, grooving, graduating or engraving. These machines are indispensable on many jobs involving either commercial products or materiel for the armed forces.

You can machine ferrous, non-ferrous or plastic materials . . . in *work shape* that's flat, uniformly curved, cylindrical, spherical or irregular . . . in *work size* varying from dime-size parts to areas as large as 10 by 20 feet.

Repetitive accuracy, a dozen or a thousand pieces, is yours with *enlarged* masters that give you advantages of the reduction ratio — an *exclusive* pantograph characteristic. You can depend on fast cutting and high surface finish from high-speed steel or carbide cutters and burrs in a wide range of spindle speeds up to 45,000 R.P.M.

Mail coupon or write for copy of the Gorton General Catalog — no obligation.

DATA ON THIS JOB

+ **DESCRIPTION:** Mill 58 key lock grooves 2.360"-2.460" long by .076"-.080" wide by .028"-.030" deep in edges of compressor impeller blades. Material is heat treated aluminum alloy forging; hardness — 120 Brinnell. Size, 28.800" dia., by 7⅝" thick.

+ **HOLDING FIXTURE:** Special; arranged for manual indexing and incorporating opposed dial indicators for positioning each blade.

+ **MASTER:** 3-dimensional, semi-automatic; pneumatically operated; enlarged 5 times.

+ **CUTTER:** 2-flute ball nose solid carbide, running at 10,500 R.P.M. Feed, 5.9" per minute with coolant. Depth of cut, .030"; width, .080".

+ **MACHINE:** Standard Gorton 3-L 3-dimensional pantograph with special tooling.

Results: **Floor-to-floor time, after set-up, is 58 minutes. Previous method took 5 hours.**

Please send at once complete information about the Gorton line contained in Bulletin 1655-1204.

Firm .....

Name .....

Title .....

Address .....

City, State .....

SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS

Specify ATLANTIC

BAND SAW BLADES

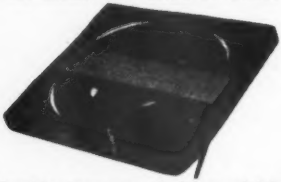
for Smoother

CONTOUR CUTTING

ATLANTIC SAWS meet all of your requirements for a superior blade on complicated die and fixture radius cutting. ATLANTIC specializes in accurate milled and precision set teeth, hardened to exact temper.

ATLANTIC'S special alloy steel insures longer wear and easier welding.

ATLANTIC'S one temper saw for all metals reduces stock you have to carry. Cut to length and welded, ready for use. Packed in strong Atlantic box. Write for new Atlantic Catalog.



Atlantic's strong, practical box, plainly marked on sides and top. Remains in good condition until entire coil is used.

Atlantic Saw Mfg. Co.

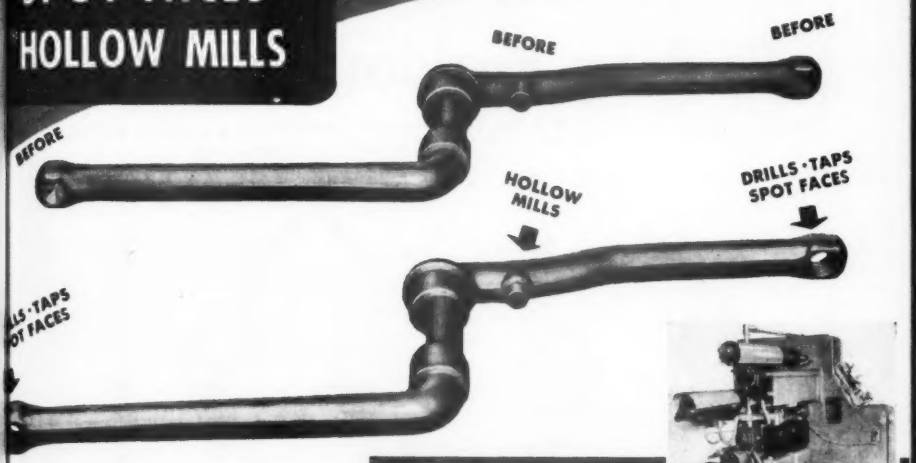
INCORPORATED

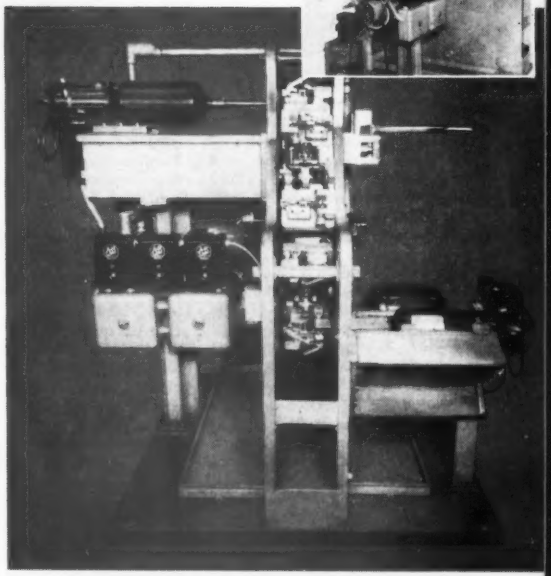
Exclusively Manufacturers of Band Saw Blades

160 Brewery St., New Haven, Conn.

DRILLS * TAPS
SPOT FACES
HOLLOW MILLS

Simultaneously!





BICYCLE CRANK COSTS ARE CUT to new low figures by this Barth-Built six station rotating machine which is adjustable to handle several sizes of bicycle cranks at a production rate of 3 per minute.

Operator places the crank forgings horizontally in the machine which locks and unlocks progressively at each station performing the following operations simultaneously:—

First Station drills and spot faces the right pedal hole.

Second Station taps right hand pedal hole with a left hand thread.

Third Station drills and spot faces the left hand pedal hole.

Fourth Station taps left hand pedal hole with a right hand thread.

Fifth Station hollow mills the "tug".

Sixth Station is used for loading and unloading.

All fixtures in the machine "float" into self-alignment with the cutting tools.

IF YOU HAVE A PROBLEM of meeting and beating competition, Barth special machines, tools or dies could be the answer to your problem. Write for catalogue.

BARTH STAMPING & MACHINE WORKS Inc.

Denison at W. 34th St. Cleveland 9, Ohio

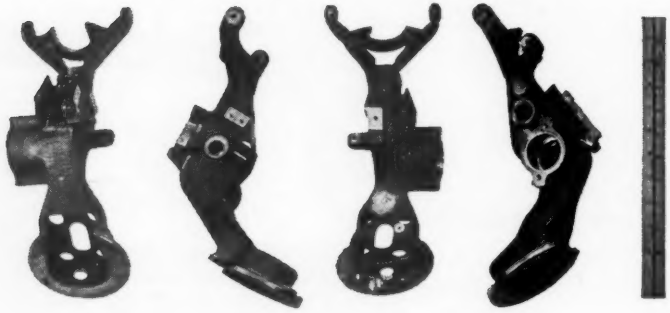
DESIGNERS AND BUILDERS OF DIES, TOOLS AND SPECIAL MACHINERY

Another Example of

Jig Borer Precision Production

31 HOLES—bored, tapped, recessed
20 MILLING CUTS
} ALL WITHIN 0.0005"

PRODUCED ON THE MOORE JIG BORER



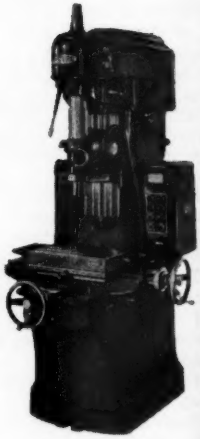
Take a good look at this precision part. It's magnesium, and has a total of 31 holes — some bored, some tapped, and 2 large ones recessed. There are 20 separate milling cuts. In addition, the base and the bevel on base are turned. All these faces and holes are held to 0.0005". Imagine how many operations it would take, the number of different machines needed, and the time expended in producing 100 of these parts.

THE COMPLETE JOB WAS DONE ON THE MOORE JIG BORER in a fraction of the time required by other means. One simple block fixture was used to hold the part around the base for all operations. Using the Moore micro-sine table and parallel set-up blocks, only 11 set-ups were necessary.

The speed accuracy and simplicity of operation of the Moore Jig Borer are the results of a combination of time-proven features, including hardened, ground and lapped lead screws for precise, rapid table settings within .00015" by coordinate location; infinitely variable spindle speeds — push-button controlled — from 75 to 2400 RPM; three power-feed ratios — .0015", .003" and .006"—per revolution of spindle in either direction; centralized control panel; disconnect clutch for easy indicating and totally enclosed drive mechanism.

● Write for the new 24-page No. 2 Jig Borer catalog, which contains complete design specifications, describes Jig Borer accessories and gives further examples of Jig Borer jobs — in the toolroom and on the production line.

MOORE SPECIAL TOOL CO., Inc.
726 Union Ave., Bridgeport 7, Conn.



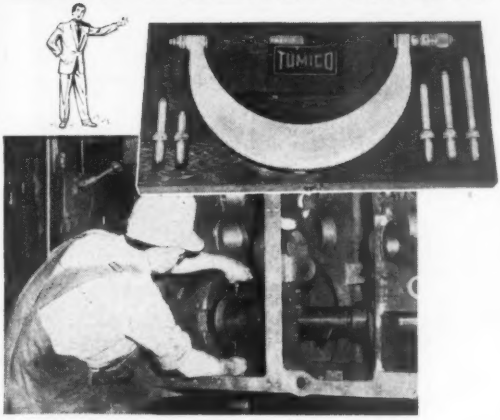
NO. 2 MOORE JIG BORER

ADD MOORE TOOLS TO YOUR TOOLROOM

JIG BORERS · JIG GRINDERS · PANTO-CRUSH WHEEL DRESSERS · DIE FLIPPERS
MOTORIZED CENTERS · HOLE LOCATION ACCESSORIES

PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION

Get Fast, Accurate Bore Measurement



WITH THE TUMICO OVER-THE-BAR MICROMETER

The Tumico Over-the-bar micrometer makes speedy bore diameter measurements without removing the boring bar or disturbing cutter settings. Light-weight hollow steel frame makes precision measurements easy . . . gives the "feather touch" needed for extreme accuracy! Made in 11 models ranging from 3" to 28", Tumico Over-the-bar micrometers are fully and easily adjustable for wear.

All Tumico micrometers, gages and measuring instruments include advance design principles to measure diameters to 96". Skilled engineering has reduced weights up to 50%. "Feather touch" feel and balance speeds measurements and insures accuracy.

Tumico instruments control production for many of America's largest manufacturers. Consult us for special production gages, calipers, alignment instruments, etc. Catalog sent free on request.

TUBULAR MICROMETER CO.

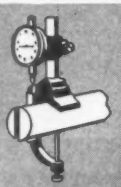
ST. JAMES, MINNESOTA

SEATTLE • LOS ANGELES • DENVER • DALLAS • CHICAGO • MINNEAPOLIS • KANSAS CITY
DETROIT • ATLANTA • NEW YORK • TORONTO, CANADA • EXPORT OFFICE: CHICAGO

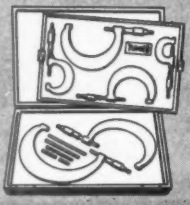
FOR EVERY JOB

TUMICO

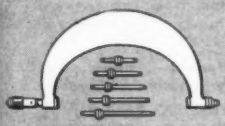
PRECISION MEASURING INSTRUMENTS



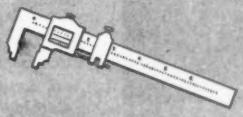
TUMICO POST GAGES
Precision micrometer or dial indicator instruments adaptable to a wide variety of uses. 10 models.



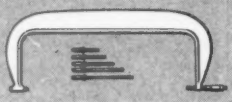
TUMICO MICROMETER SETS
Complete sets for a broad range of accurate measurement operations. From 0" to 30" in 1" steps.



TUMICO OVER-THE-BAR MICROMETERS
Precision bore measurement without removing boring bar. 11 models from 3" to 28".

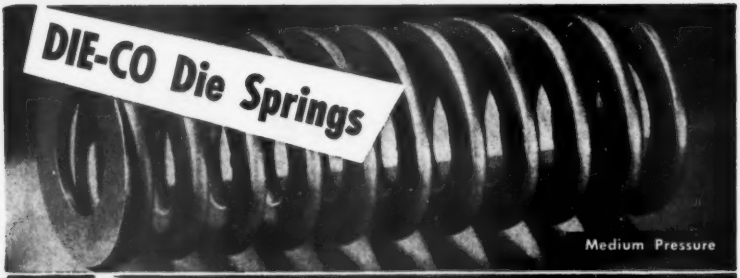


TUMICO VERNIER CALIPERS
Precision made. Accurate, clearly etched graduations and numerals. 24 models from 6" to 48".



TUMICO BAR MICROMETERS
Provide a wide range of precision measurement with low investment. 30 models from 6" to 168".

SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS



Tougher, Livelier, Last many times longer!

DIE-CO Compression Spring Assortment

More economical! Made of finest electric furnace, chrome-vanadium steel to exacting DIE-CO specifications. Only DIE-CO offers **three** types—Series M, Medium Pressure (50% deflection); Series MH, Medium-High Pressure (37% deflection); Series H, High Pressure (30% deflection). Available from largest, most complete assortment of high-performance die-springs.

DIE-CO Special Springs: Compression or extension springs to your specifications.

Send for DIE-CO Spring Catalog and Price List No. 403

The DIE SUPPLY Co.

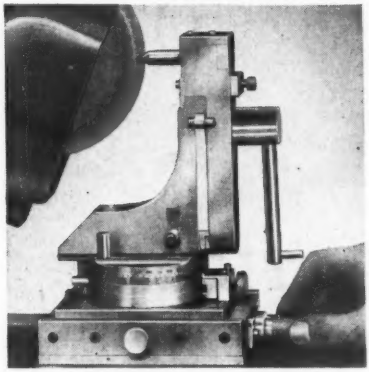
1400 Brookpark Rd. • Cleveland 9 • SHadyside 1-9000
915 Valley Street • Dayton 4 • ADams 6011

DIE-CO

FASTER FORM-DRESSING

with J & S *Fluidmotion*

RADII and ANGLE DRESSERS



MODEL "C" "Fluidmotion" DRESSER

Dress Two Angles Tangent to a Radius **in one continuous motion.**

The ONLY Dresser with a MICROMETER FEED.

For use in repetitive precision production, where extremely precise depth of radii and simplicity of operation are required. Lead-screw handle graduated to .001"—moves dresser forward, backward with sensitive **range of full inch.**

"FLUIDMOTION" is the simplest, most accurate method for form-dressing. **It allows dressing** the entire angle-radius-angle wheel profile on surface and cylindrical grinders **in one continuous motion**—with one easy setting. A clean, precise form results, with no tool or chatter marks. Angles and curves flow into each other.

Highly **skilled operators** and elaborate set-ups are **unnecessary. Beginners quickly learn** to turn out contours accurate to .0001".

Features: Automatic centering, dustproof and chatterless, high-carbon, high-chrome construction. Dresses wheels up to 20" in diameter—easily adaptable to all surface and cylindrical grinders, with J & S fixtures.

J & S "FORM-MASTER" ANGLE and RADIUS DRESSER—less expensive—dresses both angles and radii.

WRITE FOR FURTHER INFORMATION

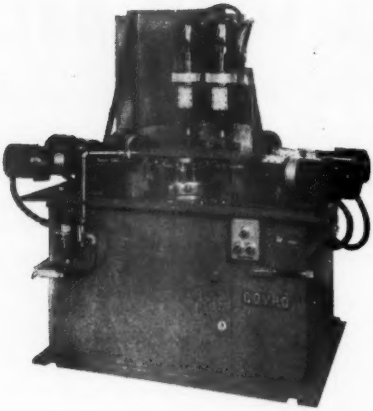
SEND FOR BOOKLET, "Machine Shop TIME SAVERS by J & S". Illustrates and explains: Cutting Tools, "Down-Hold" Vise Jaws and "Attachable" Parallels, "All-Purpose" Jaw Clamps, and J & S Form Grinding Service.

J&S TOOL CO., INC.

475 Main Street, East Orange, N. J.

Representatives in Principal Cities

SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS



8 OPERATIONS

Performed at the Rate of 1200 Pieces Per Hour

How production can be increased and labor costs reduced by the use of Govro-Nelson Automatic Drilling and Tapping Units is shown by the above machine which drills, reams, countersinks and taps a small brass part, performing 8 operations at the rate of 1200 pieces per hour.

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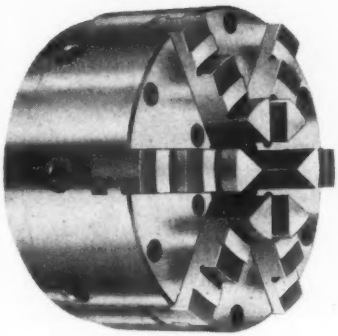

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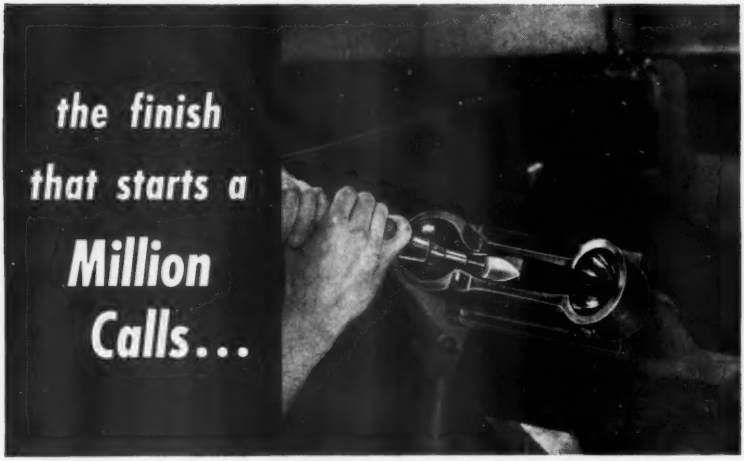
SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS



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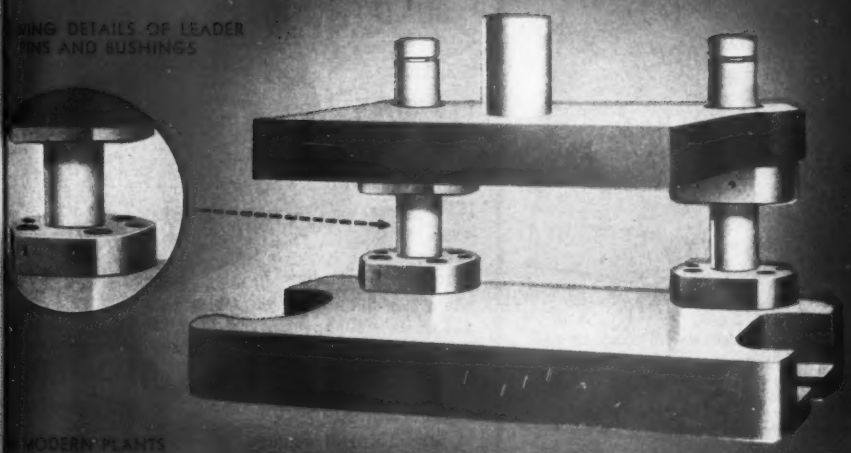

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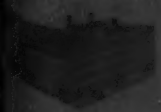

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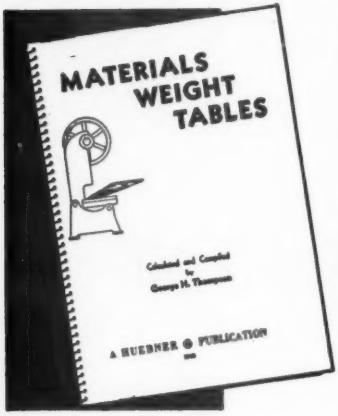

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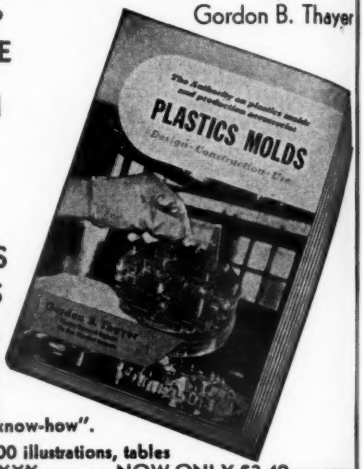

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"Can Industry Parry the A-Bomb?" by Randolph Hawthorne 64
In this country we suffer from an inertia born of incredulity that we actually will be bombed or if we are that we can do anything about it. Mr. Hawthorne recommends emergency planning by industry for the protection of plants and personnel by providing bomb shelter and suggests the type and location. The power of penetration, blast effects and what we should do now are detailed.

FEATURE SECTION: "Automation at Ford", by William R. Slattery 67
This is the first of a three-part article covering the latest Ford developments in manufacturing techniques. The story shows how automation has evolved from Ford's early work in mass production. Mr. Slattery thoroughly explores the advantages and disadvantages of Automation and (in Part II) shows how to develop an Automation system. He follows this up with the economics and maintenance of Automation equipment. The entire series is profusely illustrated.

"Machining Stainless Steels" by Lester F. Spencer 74
Operational steps, tool materials and lubrication are covered in Mr. Spencer's final installment. It includes a table of the approximate cutting speed limitations for various stainless steels and was compiled because it is often desireable to calculate the allowable speed of each operation within a sequence of operations and to use the lowest speed allowable as the base speed. The choice of tools for many operations is tabulated.

"Die Casting Die Design", Part IV (continued) by H. K. Barton and James L. Erickson 79
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proper, of a properly designed runner vs a poorly designed runner is given in this installment.

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This article features three methods of using adjustable and interchangeable punch and die units to conserve tooling, money, time and skills. These methods save press downtime caused by die design changes and by broken punch replacement.

"A Method for Eliminating Milled Fixture Key Slots" by Albert E. Schultz 88
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"Handy Rotators for Tank Fabrication" by Herbert Chase 96

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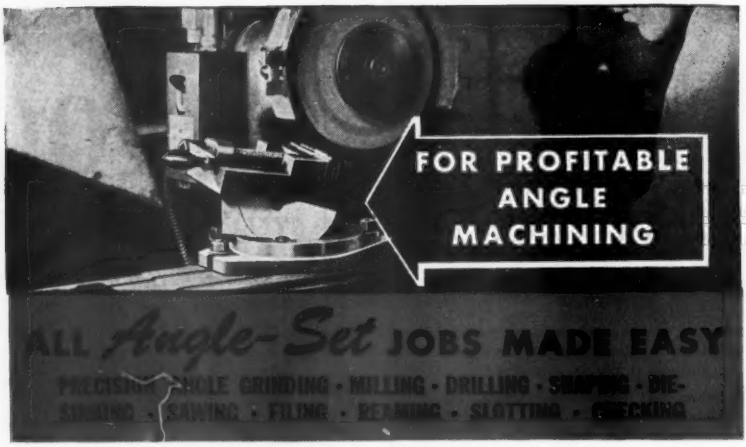
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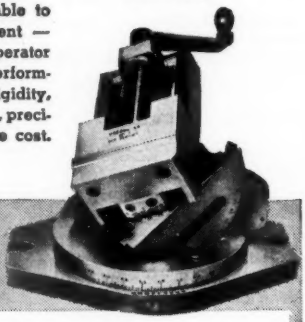

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Briefly stated, this idea of some 15 years ago was that TOOLING, the most important of the fundamental elements of manufacturing, was not receiving the attention it deserved. Our reasoning was that if more ingenious TOOLING, including tools, dies, jigs, fixtures, gages, machine tools and their accessories, enabled certain manufacturers to achieve effective mass production, then such better TOOLING should lower costs and improve quality for all manufacturers. This because a very important consideration in the years just before World War II.

Even before Pearl Harbor, the soundess of our decision to develop usable technical editorial data on such better TOOLING—its design, manufacture and its use—was proved and our publication had expanded greatly in readership and in advertising support.

May we refer modestly to the fact that our strategic circulation among men and companies who manufacture and/or use TOOLING brought the writer a request to make available to industry through the Office of Production Management the data that would enable defense industries to locate and expand additional sources qualified to manufacture TOOLING.

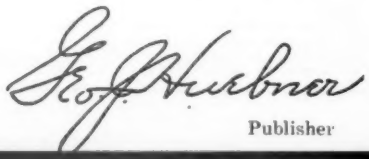
Although the writer's 26 months of service in Washington was wholly separate from publication of TOOL & DIE JOURNAL, it was natural that the TOOL & DIE JOURNAL staff would carry on along the line of greatest benefit in the war effort. The result was a development of readership by men in all metalworking industries whose responsibility was specifically "Better TOOLING for Better PRODUCTION."

These last 15 years, during which we have been privileged to contribute editorially to the phenomenal growth of American Industry, brought forth very interesting developments. Longer-wearing tool and die steels were introduced, some with self-lubricating characteristics; the new carbide tools began to show their phenomenal production runs, with which came the era of "higher speeds and faster feeds." Toolroom machine tools that *made* TOOLING and production machine tools that *used* TOOLING had to be redesigned; metal stamping and drawing presses utilizing new high speed dies with high precision die sets ran at unheard of speeds. Twenty-station dies became almost garden variety and the transfer press idea took hold.

Also, we pioneered in presenting a large volume of fundamental editorial material featuring Quality Control. We described to the many what the few had been working with for some years. Intermingled with all the rest was much material on the significant developments in the fields of honing, lapping, precision grinding and surface finishing and the art of optical measurements and control.

And now there is AUTOMATION! Ever heard of it? A *few* have, but the *many* have not. It's an outstanding Ford Motor story and we are privileged to bring it to you. It discloses the newest of the cost-cutting, labor-saving methods developed by the Ford idea men. You will see the first of this new series on page 67.

Also, you will see that TOOL & DIE JOURNAL has become The Magazine of TOOLING and PRODUCTION in name as well as in fact, thus setting forth accurately and completely its editorial and advertising content. Although for many years TOOL & DIE JOURNAL has provided complete coverage of the TOOLING and PRODUCTION activities of Industry, the name TOOL & DIE JOURNAL has not accurately described our readership. So, beginning with Volume XVII, Number 1, (April, 1951) TOOL & DIE JOURNAL becomes TOOLING and PRODUCTION.



Publisher

Randolph Hawthorne asks and answers:

Can Industry Parry the A-Bomb?

This country today is faced with the threat of air bombardment. And—as in Europe in 1939—we suffer from an inertia born of incredulity that we actually will be bombed, or that if we are, we can do anything about it.

We take refuge in watching our production trend upwards, and our military backlogs expand. Industry concentrates on its job—production! The resulting attitude is, "Let the government and military worry about air raid protection. Besides, if we are bombed, we'll have had it—there just won't be any more production in this plant, brother." A vision of the factory, its machine tools and personnel floating off in atomic dust fleetingly crosses the mind.

Something Can Be Done

But something can be done about air raid protection, even against the atomic bomb. This was proven at Hiroshima and Nagasaki, not to mention the remarkable and effective efforts of German industry, spurred on by the Speer Ministry, in maintaining, renewing and even increasing production under devastating air attacks in the last war.

The British, whose experience under Hitler's blitz taught them a lot about air raid precautions, examined the two atom-bombed Japanese cities from the standpoint of what a similar bomb could do to them. They came away not unduly pessimistic, considering the almost universal acceptance in this country that no defense against the A-bomb is possible. Our own official reports back them up. Furthermore, industrial plants are more amenable to defense measures than is a city, and in addition enjoy other advantages of the small compact body over a large heterogeneous mass.

Evaluating the A-Bomb

First fact to consider is this: All major factories in Hiroshima were on the periphery of the city—and escaped serious damage. This was almost equally true at Nagasaki. Plants and dockyards at the city's southern end were left intact—only those in the valley where the bomb exploded were seriously damaged.

"So spread out were the industries in both cities," the U. S. Strategic Bombing Survey stated, "that no single bomb could have been significantly more effective than the two actually dropped."

These findings merely reiterated those discovered in Germany where conventional RAF area raids frequently devastated the heart of a city, while industries situated on the outskirts continued in production.

Second fact. The most instructive thing at Nagasaki, reported USSBS, was the survivial, even when near ground zero (directly under the atomic explosion), of the few hundred people who were in the tunnel shelters. Without question, the report states, shelters can protect those who get to them against anything but a direct hit.

Atomic Bomb Expensive

Third fact. Atomic bombs are expensive. Now we don't mean dollars cost—or rubles. But the essential fissionable materials—uranium and plutonium—are scarce. This means the enemy must assess each target in terms of its essentiality to our war-making capacity. In addition, there is the expense of delivering the bomb to the target, and the losses that will occur through interception by our defenses.

This narrows down the field consider-

"Both industry and responsible government agencies are almost wholly unprepared with emergency measures to maintain production in the event this country is bombed," says Randolph Hawthorne, assistant editor, AVIATION AGE, after a look at the state of industrial emergency planning in the U. S. Mr. Hawthorne took part in both the bombing offensive and the survey of results in Europe and Japan as an officer with the 8th Air Force and the U. S. Strategic Bombing Survey and saw first hand how the enemy continued to maintain partial production by means of emergency preparedness measures. In this article, which first appeared in AVIATION AGE, he reviews some of the steps industry can take to protect itself from the atom bomb. We are indebted to AVIATION AGE for permission to submit this account to our readers. E. W. P.

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"Both industry and responsible government agencies are almost wholly unprepared with emergency measures to maintain production in the event this country is bombed," says Randolph Hawthorne, assistant editor, AVIATION AGE, after a look at the state of industrial emergency planning in the U. S. Mr. Hawthorne took part in both the bombing offensive and the survey of results in Europe and Japan as an officer with the 8th Air Force and the U. S. Strategic Bombing Survey and saw first hand how the enemy continued to maintain partial production by means of emergency preparedness measures. In this article, which first appeared in AVIATION AGE, he reiews some of the steps industry can take to protect itself from the atom bomb. We are indebted to AVIATION AGE for permission to submit this account to our readers. E. W. P.

One of the protective measures taken by the Germans in World War II consisted of the reinforced concrete structures shown here at the Focke Wulf 190 plant near Bremen. They served as shelters for personnel and records of the plant during 8th AF attacks. Blast waves pass harmlessly around the cylindrical shape. A direct hit by a 500 lb. HE bomb caused only slight damage to the top of the near structure. Although the plant itself was eventually demolished by successive attacks, the shelters remained virtually intact. FW-190 wings lie scattered about. Note underground shelter entrance to right of concrete structure in foreground.

ably. For no country in the foreseeable future will ever have enough A-bombs to afford to use one on each city of as few as 50,000 people, or on a congested area of less than five square miles, except such as contain specific installations of decisive importance to the nation's capacity for defense. In that event, the Soviet probably will resort to sabotage by its fifth column, rather than to toss an atomic bomb.

Emergency Planning

Fourth fact. Wherever emergency preparedness planning had been in effect in countries under attack in the last war, casualties were lower and production rates re-established much faster than was the case in target areas not similarly prepared, or where vigilance was relaxed.

The almost unprotected, completely surprised cities of Japan which received the atomic bomb suffered maximum losses. In Germany, particulary in industrial plants where disaster control and air raid training were well organized, and which were singled out for direct air attack, casualties were at a minimum and production was resumed, sometimes within hours, after the attack.

(What It Adds Up To)

Now, what do these four facts add up to in terms of industrial plant protection in this country? Just this: The destructive power of the atomic bomb, tremendous as it is, can be met with varying degrees of success by intelligent planning and action. Moreover, it is imperative that all measures possible are taken against such an attack on two accounts: humanity, to save the lives of as many of plant personnel as possible, and continued productivity, on which our defense relies.

By considering the first three of four facts relating to the A-bomb given above, the works manager of any plant can arrive at the approximate limits of his particular problem of emergency preparedness planning.

Take a look at your plant's location in relation to the main urban centers. Six times out of ten it's on or near, or even beyond, the periphery. Chances of your being wiped out, your installations wrecked beyond repair, are thereby reduced significantly. Also to be taken into consideration are the natural protective barriers between you and the urban target

center. If a hill lies between the plant and the city, the chances of damage are again reduced.

Due note, however, should be taken of other facilities and plants in your area which might comprise certain objectives for the planners in the Kremlin. It might be a small plant producing a highly critical item; major installations such as oil refineries and storage plants, paint and chemical plants, which present a potent fire hazard dangerous to other vital resources in the area; public utilities, etc.—if many of these are within a three-mile radius of your plant, the percentage of risk increases. In that event, it might be wise to direct efforts to the development of a progressive dispersal plan build around normal expansion and obsolescence factors.

Shelter Is Required

Secondly, you can live through an airburst atomic attack—the kind that does greatest damage over the widest area—even when right under it—if tucked away in a shelter.

This does not have to be expensively elaborate. The British Civil Defense authorities, following the report of the British mission to Hiroshima and Nagasaki, are convinced that the tiny steel-arch Anderson shelter, widely used throughout the last war, covered over with three feet of earth, will effectively protect its occupants from all three of the A-bomb's killing powers: heat, radioactivity and blast. In Japan it was found that even crude wooden-frame, earth-covered backyard shelters less than 100 yards from ground zero sometimes remained intact.

If you can't build shelters to house your employes, evaluate and designate plant structures which might be adapted or converted into shelters, keeping in mind the three lethal powers of the Bomb. Structures selected for shelter purposes must be capable of resisting—four about one second—a heat flash yhich, just underneath the explosion, raises the surface temperature of objects by many thousands of degrees. This heat flash, while it has no great penetrating power, can directly ignite inflammable material.

The structure must also be capable of stopping radioactive rays in the form of gamma rays, which have an effective danger range from a high air burst of about one and a half miles from ground zero, and neutrons whose lethal range is much shorter, but which differ from gamma rays in that they render radioactive many materials which they penetrate. Most of the gamma rays and neutrons are emitted in the first few seconds after the explosion—after one minute there is little danger from either, other than possible induced radioactivity of materials exposed to the neutrons.

Power of Penetration

Although both gamma rays and neutrons have great penetrating powers, the design of shelters is a practical proposition. The principle in shelter design is "screening"; the denser the screening material, the greater its power of reducing the intensity of gamma rays in a given thickness.

Brick and concrete have a greater stopping power than has wood of a given thickness, and lead greater than either. British Civil Defense authorities, in their manual of basic training for Atomic Warfare, declare that really thick masonry would remove the danger from gamma rays altogether, even close to ground zero, while only a few feet of earth overhead would give immunity.

Delayed radiation risks are not considered likely to be serious with high air burst bombs.

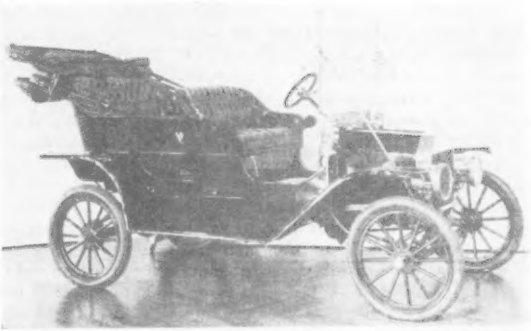
Blast Effects

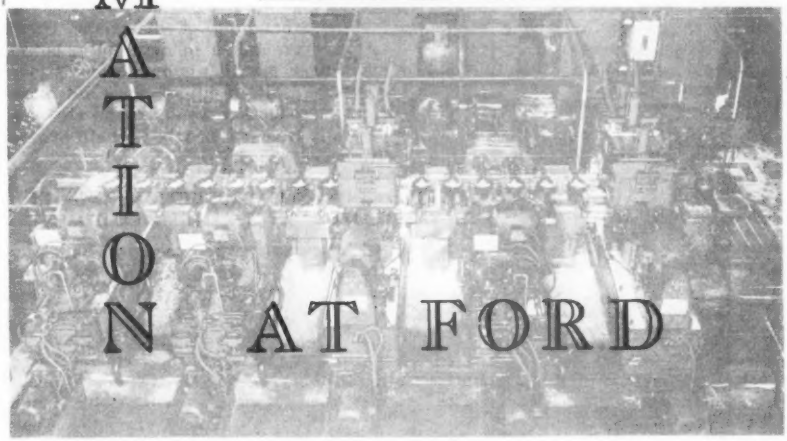
Effects of blast from an atomic bomb will be of greater concern than radiation. From air burst bombs the blast wave is from above downwards, striking the roofs first. Near the center of the damaged area buildings are collapsed, or, with exceptionally strong structures, the roofs are crushed in or dished even though the walls remain standing. Away from the center, where the blast wave becomes more horizontal, buildings are pushed over or distorted. However, a reinforced concrete structure of the earthquake resistant type suffered no serious structural damage in Hiroshima, although situated only 300 yards from ground zero.

(Continued on page 104)

TOOLING and PRODUCTION's Special Feature:

AUTOMATION AT FORD





"Automation," a word coined by Mr. D. S. Harder, Vice-President — Manufacturing, of the Ford Motor Company, means the automatic handling of materials being processed between progressive machine operations. "Automation at Ford" is from a talk by William B. Slattery of the Ford Manufacturing Engineering Staff, before the Cleveland Engineering Society, and includes a three-page illustrated case history, "Valve Push Rod Assemly." Next month will treat the "Development of an Automation System".

AUTOMATION AT FORD

THE EARLY DEVELOPMENT OF MASS PRODUCTION IN THE FORD MOTOR COMPANY

To help understand the present emphasis on automation at Ford it is desirable to briefly trace the early history of the Company in the development of mass production of automobiles.

Shortly before World War I, Henry Ford set up an assembly line to produce flywheel magnetos. This first installation of progressive assembly on a moving conveyer reduced assembly time from 20 minutes to 5 minutes.

This technique was applied to other small parts and assembly time was cut in half. These successes led to the big test of this new method. Chassis were produced in a street along the factory by pulling them along a 250 foot route past piles of parts spaced at regular intervals. Men walked along the moving chassis and picked up parts to bolt to it. This experiment reduced time from fourteen hours to six hours.

by **William B. Slattery**
Manufacturing Engineering Staff
Ford Motor Company
Dearborn, Mich.

From this, it was decided to mount the wheels on the chassis and roll it down a channeled track from one station to the next. Introduction of a moving chain conveyor eliminated the need for pushing the chassis.

These successes resulted in the installation of conveyors throughout to deliver parts to the main assembly line.

This basic technique was a large factor in the ability of the Company to produce the Model T car in the large volumes which made it the largest producer in the industry.

Along with this there was a mammoth program of development of improved production processes. Studies were made in simplification of work. Machines and equipment were constantly shifted to minimize handling of materials. Great strides were taken in developing better and faster machining operations.

As a result of all of these advancements, production went up and the cost per unit was cut nearly in half over a five year period.

EXPANDED PRODUCTION AND ITS EFFECT ON RECENT DEVELOPMENTS

The expansion program was made to produce the Model T car and many fine examples of automatic machines were utilized.

Handling was largely by means of everhead conveyors with machines placed very closely together and layouts developed with few aisleways and with much lower stock storage requirements than we find necessary today.

Gradually, the design, styling, size, shape, etc., of the product changed and complicated the processes. As new changes in product occurred, changes in facilities were made to utilize as much as possible existing facilities without major tear-ups.

In very resent years it became apparent that new products required major changes to productive processes. The Plant Layout Department developed layouts on the basis of new products and present day conditions.

In starting this program of expansion and improvement two departments were given full recognition. Material Handling Engineering was set up as a separate

AUTOMATION of Valve Push Rod Assembly . . .

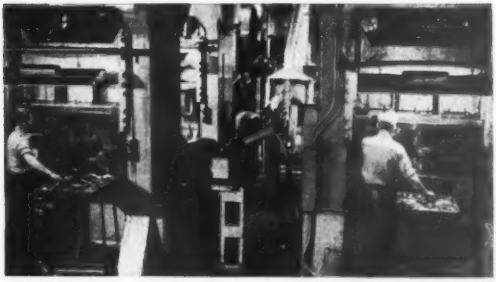


Fig. 1. The operator loads the circular blanks into a hopper which automatically loads the three-stage rotary progressive die. After the third draw, the part is pushed out into a tubular chute which is extended to the belt conveyor in the middle for delivery to the tumbler washer.

Fig. 2. The washer which concludes the operations of Figure 1 delivers to the elevator and to a three-section bin. The bin feeds by gravity to the hoppers which in turn feed the parts to the die ring of the press, two at a time. One operator handles three machines which are on an automatic cycle.

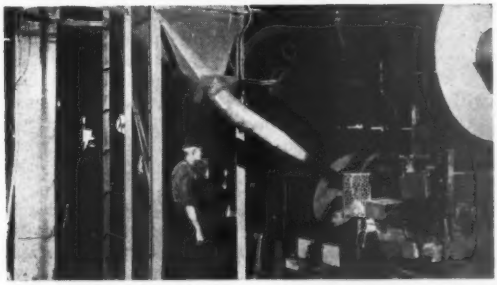


Fig. 3. Stock feeds by gravity to the belt conveyors, up the elevator and to the bin system. The chutes feed by gravity to hoppers and thence automatically to a group of No. 6 Toledo Presses. One operator handles the three machines which pierce a small vent hole.

Fig. 4. The piercing presses deliver to a conveyor at the back which automatically delivers to a tumbler type washer.

department and worked very closely with Plant Layout. The automation activity was set up as a part of Plant Layout.

Both groups contributed substantially to the improvement programs developed.

The early automation programs worked out were chiefly concerned with the rearrangement of standard and existing machines to tie them together with mechanical devices to eliminate need of manual operations. Many arrangements were worked out to lower production costs.

At the present time we find new programs based on the wide introduction of machinery and equipment which have been designed with automation in mind.

The program is going forward to include all phases of Manufacturing Engineering on a coordinated basis to tie in all operations together in programs which are new from the ground up.

DEFINITION OF AUTOMATION AND ITS SCOPE

Automation is the automatic handling of materials being processed between progressive machine operations.

The equipment utilized moves parts into and out of production machines, turns the parts over or rotates them, removes scrap, etc.

These operations are timed with the process and are ordinarily completely automatic.

A finished piece of automation equipment is made up, mostly, of standard elements such as conveyors, air, hydraulic and electric control mechanisms, to gain the proper movement for elimination of unnecessary manual handling operations.

As shown by the accompanying illustrations, a wide variety of materials can be handled with substantial savings, and at the same time, eliminate hazardous handling such as in large stampings, heat treat operations, forging operations, etc.

Automation, in many respects, is the extended usage of conveyors which played such an important part in the early development of mass production of automobiles.

"Automation" as a separate and distinct phase of production engineering is a development of the last decade. The word was coined by Mr. D. S. Harder, new Vice-President—Manufacturing, of the Ford Motor Company. Automation has been seen in its true light and has received proper emphasis since general acceptance of the word.

I am certain that you will all recognize some of the work done in progressive stamping work, some of the early machines using automatic transfers, etc. as part of the general subject we are talking about tonight.

In the spring of 1947, a separate department was set up to concentrate on development of systems which could help solve the problems in connection with the transfer of parts between machines. The entire program has been speeded up and proper coordination has been possible since.

At present, there are many groups in the various divisions of the Company working on the problem, as a result of the decentralization program of the past several years.

Instead of the cut and try method often used in the past, automation is now on a sound engineering basis with emphasis on proper design for simplicity to eliminate maintenance problems after installation and to obtain completely automatic operations. The individual and specialized treatment possible with this type of system has produced results which would have been impossible on any other basis.

With a definition of the subject now established, we should take a look at the general advantages and disadvantages before proceeding further.

ADVANTAGES

(1) Lower Production Costs. Lower costs as we all know are always a very important consideration in all facilities programs. Automation helps by relief of manual effort required in handling parts, especially in large volume operations. This does not mean elimination of all manpower but rather it is part of a trend to reduce human drudgery, increase output and will result in the need for more people in the skilled trades and a general redistribution of manpower. It is part of our way of life to increase pro-

AUTOMATION of Valve Push Rod Assembly . . .

Fig. 5. Delivery of parts from the previous washing machine is made to an elevator which in turn delivers to the bins. Chutes feed the part to a group of five welders which weld a disc to the closed end. Operators are required to make the assembly and tend the welders. If this operation were to remain, it is felt that automation could be worked out.

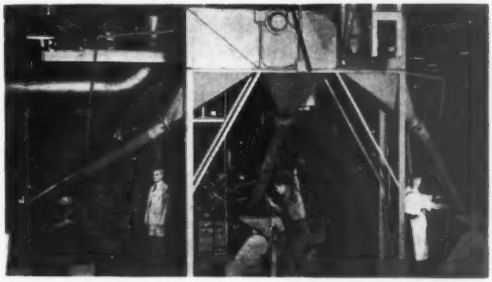


Fig. 6. The same method of bucket elevator, bins and chutes is used here to feed three banks of centerless rough grinders. Each bank contains three machines which are automatically connected. The work is passed automatically between these machines on chutes. After the third grind, the parts deliver to a system of bucket elevators, bins and hoppers to feed a grinder.

Fig. 7. These two machines are fed automatically from the left of the view by conveyor. The rough grinding of the bottom is completed and the part is chuted to the assembly table for assembly into the heat treat baskets. A hinged plate is under the rectangular shaped pile and the operator sets the basket over the top. A simple flip-over of the group loads the basket.

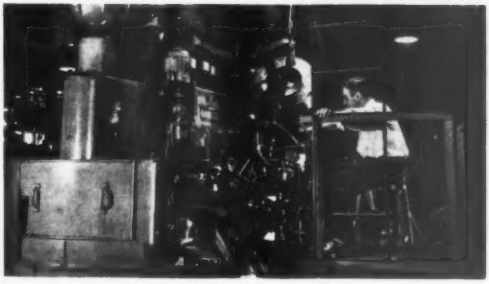


Fig. 8. This machine finish grinds the bottom and top and is set up the same as the rough grind. The operator is tending the entire mechanism and machine.

duction, raise our standard of living, and eliminate monotonous, repetitive work.

The direct labor savings can be very worthwhile.

(2) Increased Machine Speed. Automatic transfer between operations has resulted in greater use factors for machines. This resultant operation of machinery at closer to its design capacity will naturally save direct labor costs. The advantages of using high cost machinery to a greater degree are, of course, obvious. Some good examples of these are in the press lines where it was impossible to load the presses fast enough by hand to keep them running continuously. Automation made it possible to do this on many machines.

The tie-in of all elements of a production process for complete synchronization is a trend which is gathering momentum regularly.

(3) Quality. Less scrap and few rejects have always been an objective of production people. Automation definitely helps this program by reducing the damage caused by parts hitting each other or falling to the floor.

(4) Safety. Many parts are cumbersome to handle manually and are hazardous with even the best safety devices. Handling of stampings into and out of presses, at turn-over operations, etc., are good examples of hazardous operations which have been eliminated.

This problem and the reduction of unusual manual effort in many cases, in itself, is justification for automation.

DISADVANTAGES

(1) Maintenance Costs. This is a subject always brought up in discussing automatic equipment of any kind. The introduction of automation devices into the production process naturally caused maintenance problems which, in cases, have offset installation savings.

Many departments have become nearly 100% automatic which means that any breakdown of even the smallest element can shut down the entire line. We feel that this maintenance problem is gradually being minimized.

As skill in automation design has increased, the details of the systems have been simplified, many of the devices have been made more substantial, and preventive maintenance is practiced more all the time. Each of these factors has played a part in reducing maintenance costs.

(2) Engineering Costs. These costs, of course, are common to all engineering endeavor but are especially important here because of the need for coordination of so many elements such as plant layout, tool design, die design, machinery tool builders, material handling engineering, etc.

Much careful planning is required and hours of work are necessary before construction can start. Wood dimensional models are sometimes needed and, often times, three-dimensional drawings.

(3) Installation Costs. Installation costs are a normal item in the installation of any equipment. An unusual problem occurs when existing operations are studied and automation is found necessary. Rearrangement of large machinery can be an expensive item. However, many cases of this kind have come up and have been justified on the basis of the advantages gained. By proper planning, this can be handled at model change time when rearrangements would be necessary, anyhow.

(4) Specialize Nature of the Equipment. Every product we study requires special consideration because of its size, shape, different shapes and size of machinery needed for production and the varying space between machines and in the available buildings. This problem has been minimized as experience has increased and the opportunity to study the problems at the beginning of new programs have presented themselves.

This list of advantages and disadvantages is intentionally general to give an idea of the scope of the problem before going further.

(Continued next month)

Having detailed the advantages and disadvantages of Automation, Mr. Slattery will present next month an outline for the development of an Automation system. The illustrated case histories to follow are "Piston Production," "Automation at Buffalo Stamping Plant," and "Axle Housing Manufacture."

AUTOMATION of Valve Push Rod Assembly . . .

Fig. 9. Stock from top and bottom finish grind is fed to the hopper which automatically feeds the machine for chamfering. This machine in turn chutes the parts to the finish grinders which deliver to a cross conveyer to the next operation. The operator is an inspector who is spot checking the finish dimension.

Fig. 10. The hopper at the extreme left feeds the lapper which in turn delivers to a short elevator and automatic feed to the washer. The final visual inspection can be seen at the end of the line. The operator is an inspector who is spot checking.

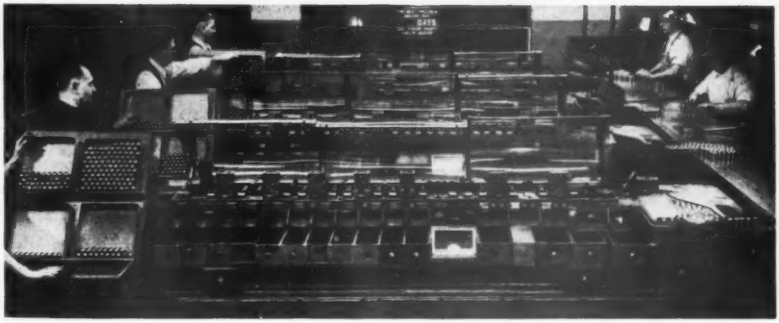


Fig. 11. Stock from visual inspection enters the gage room. A last visual check is combined with the distribution of parts to the inspection machine. The parts progress automatically through the machine on an intermittent cycle. Each of the small boxes contains a gage which moves up and down with the cycle of the machine. The gage is electrically tied into a small ejector which pushes the parts out at the proper station. Most of the parts pass through the entire cycle because they are of the mean dimension which is desired. The others, which constitute a small percentage, are needed for selective fits in some cases at the engine assembly.

Machining the Stainless Steels

Part IV

Operational Steps

In a discussion of feeds and speeds to be used in the machining of stainless steels, only approximate recommendations can be made since the conditions that exist in each individual shop vary in accordance with such factors as type of tool material, lubricant factors, accuracy desired, and planned operational step break-down to be used on the specific automatic equipment. Table II indicates the approximate speed limitations for various stainless steels.

by **Lester F. Spencer**

Chief Metallurgist
Landers, Frary & Clark
New Britain, Conn.

It is often desirable to calculate the allowable speed of each operation within a sequence of operations, and then use the lowest speed allowable as the base speed. If insufficient production is the result, the offending operation which needs the slower speed is delegated as a secondary operation. This is a matter of judgment. In reference to both Figures 1 and 2 which give the operational sequences, it may be well to review these operations.

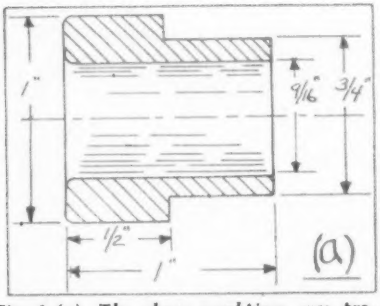


Fig. 1-(a). The above workpiece was produced as follows (t, turret; s, slide): Material, Stainless type 430F
Operational steps:

1. *Stop* ..... (t)
2. *Spot, Chamfer Front* ..... (t)
3. *Drill, (0.01" undersize)* ..... (t)
4. *Ream* ..... (t)
5. *Swing Recess Tool, Chamfer Rear* ..... (t)
6. *Form (overlap)* ..... (s)
7. *Cut-off* ..... (s)

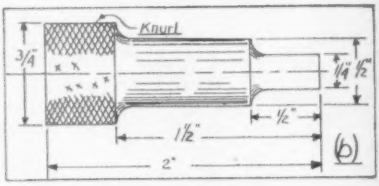


Fig. 1-(b). This stainless steel component was tooled as follows: Material, Stainless type 303
Operational steps:

1. *Stop* ..... (t)
2. *Rgh. Turn (¼"-bal. turning tool)* ..... (t)
3. *Rgh. Turn (½"-bal. turning tool)* ..... (t)
4. *Fin. Turn (¼"-Box tool)* ..... (t)
5. *Fin. Turn (½"-Box tool)* ..... (t)
6. *Knurl (adjustable)* ..... (t)
7. *Chamfer and Cut-off* ..... (s)

In Figures 1-(a), 1-(b), 1-(c) and 1-(d), all of the jobs listed were performed on a Brown & Sharpe No. 2 machine.

In Figure 1-(a), a ferritic 430 F. composition was used. The first turret position is reserved for feeding the stock to a stop position; the second operation on the turret spots the piece for succeeding drilling and the circular form tool begins; the third turret position drills while the forming still is in operation; reaming the undersized drill hole occupies the fourth turret position and the fifth turret position chamfers the rear, using a swing recess tool. The last operation is on the slide and cuts the finished part from the bar.

In Figure 1-(b), both the balanced turning tool and the box tool are used in forming; all of the turrets are filled while the slides are reserved for chamfer and cut-off. Since the austenitic 303 stain-

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CINCINNATI 28" Vertical Hydro-Tel Milling Machine. Catalog No. M-1284-3. Brief specifications in Sweet's File for Mechanical Industries.

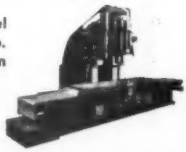

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TABLE II GUIDE AS TO CUTTING RATES FOR THE STAINLESS STEELS (F)

AISI Type Numbers	403* 405 410*	416*	420 420F**	430	430F
Brinell Hardness Range on which the following rates are based	180/240	180/240	180/230	170/230	170/230
Surface Feet Per Minute					
Automatic Screw Machine	90/100	120/150	80/100	90/100	120/150
Heavy Duty Single or Multiple Spindle	80/100	110/130	60/80	80/100	110/130
Turret Lathe (Based on tungsten or moly high speed tooling. Rates may be increased 15/30% with high cobalt or cast alloys)	80/100	100/130	60/90	80/100	110/130
Automatic Screw Machine (Swiss type) (Based on Cast alloy or Carbide tooling)	110/140	120/150	90/120	110/140	120/150
Milling	40/60	50/80	30/50	40/60	50/80
Reaming					
Smooth Finish at .003"/.0075" feed	15/40	15/40	15/40	15/40	15/40
Work sizing at .003" to .0075" feed (Based on tungsten or moly high speed tooling. Greatly increased rates obtainable with carbide tooling)	40/120	40/120	40/120	40/120	40/120
Threading	10/25	10/25	10/25	10/25	10/25
Tapping	10/25	10/25	10/25	10/25	10/25
Drill Press (Based on tungsten or high speed tooling)	40/80	60/90	30/50	40/80	60/90
Single Point Turning					
Carbide Tooling					
Roughing	150/200	150/200	100/150	150/200	150/200
Finishing	200/400	200/400	150/250	200/400	200/400
High Cobalt or Cast Alloy					
Roughing	100/130	100/150	80/100	100/130	100/150
Finishing	100/150	150/200	100/150	100/150	150/200
Tungsten or Moly High-Speed					
Roughing	80/100	80/100	60/80	80/100	80/100
Finishing	80/130	100/150	80/120	80/130	100/150

*Harder stock in the Brinell range of 260/325 may be machined by reducing these speeds approximately 25%.

414* 431	440A 440B 440C 440F**	446	301 302 304	303	309 316	321 347
230/280	200/265	170/230	150/250	150/240	150/240	150/240
Surface Feet Per Minute						
80/100	60/80	80/100	70/90	100/130	60/80	70/90
70/90	50/70	60/80	60/80	90/120	60/80	60/80
70/90	50/70	60/80	60/80	90/120	60/80	60/80
100/140	60/100	100/140	80/120	110/130	80/120	80/120
40/60	30/50	40/60	40/60	40/60	30/50	40/60
15/40	15/40	15/40	15/40	15/40	15/40	15/40
40/120	40/120	40/120	40/80	40/120	40/80	40/80
10/25	10/25	10/25	10/25	10/25	10/25	10/25
10/25	10/25	10/25	10/25	10/25	10/25	10/25
40/60	30/50	40/60	30/50	50/80	30/50	30/50
140/180	100/150	140/180	130/180	150/250	130/180	130/180
150/350	150/200	150/350	150/300	200/400	150/300	150/300
90/120	60/80	100/130	100/130	100/150	100/130	100/130
90/140	80/100	100/150	100/150	150/200	100/150	100/150
60/80	40/60	60/90	60/90	60/90	70/90	60/90
80/100	60/80	90/120	100/120	100/140	100/120	100/120

**When used on automatic screw machine equipment, the free-machining type allows an increase of about 10% over cutting rates shown.

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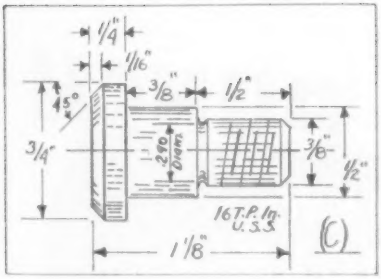


Fig. 1-(c). The production of this threaded piece in stainless steel follows:
Material, Stainless type 416
Operational steps:

1.	*Stop*	(t)
2.	*Form*	(s)
3.	*Thread*	(t)
4.	*Chamfer and Cut-off*	(s)

less is employed, heavy feeds at slow speeds are taken so that the tool can cut deep enough to get under the work-hardened skin.

Figure 1-(c) illustrates a form and threading operation. The first turret position feeds the stock to stop, after which the circular form tool on the slide forms

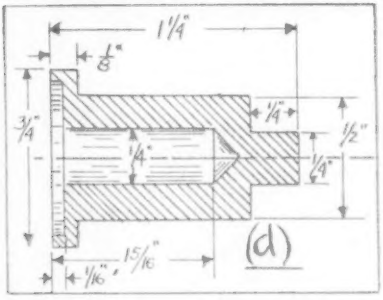


Fig. 1-(d). A stainless steel piece requiring the seven following operations:
Material, Stainless type 430F
Operational steps:

1.	*Stop*	(t)
2.	*Spot*	(t)
3.	*Drill*	(t)
4.	*Finish drill*	(t)
5.	*Counterbore*	(t)
6.	*Form (overlap)*	(s)
7.	*Cut-off*	(s)

the body; a thread chaser is employed on the second turret position; and the second slide position performs the chamfering of the succeeding piece and cut-off.

In Figure 1-(d) is an example of a deep hole that is drilled in two operations. The first turret position feeds the stock to stop; the second turret position spots for drilling; the third turret position drills to approximately 5/8" in depth and the fourth turret position completes the

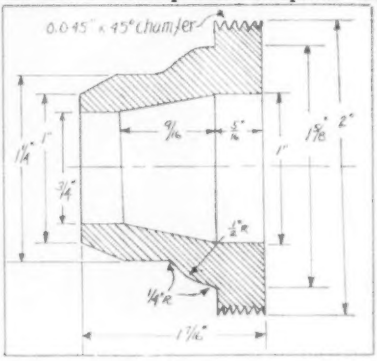


Fig. 2. A stainless steel job as run on a multiple spindle machine:

	CROSS SLIDE	*TURRET*
1.	*Rough and form small diameter*	*Spot drill*
2.		*Drill for 1" reamer diameter*
3.	*Finish form*	*Drill for 3/4" reamer diameter*
4.	*Face end and chamfer for thread*	*Rough counterbore*
5.		*Finish counterbore*
6.	*Cut-off*	*Thread*

drilling. During drilling operations, the slide position with a circular form tool overlaps. The fifth turret position is reserved for counterboring after which the second slide position performs the cut-off.

The job that is illustrated in Figure 2 is done on a six spindle automatic. Six turrets and four slide positions are utilized. Both rough and finish forming are done with the dovetail type forming tool;

(Continued on page 94)

Die Casting Die Design

Part IV (Continued)

by **H. K. Barton**

and

James L. Erickson

Mr. Barton has succeeded in devising a method of joining the runner to the injection chamber that permits the die designer to locate his sprue in the center of a symmetrically situated ring of die cavities, and at the same time to have his runners open into the sprue hole at any point on its periphery without running the risk of having molten metal flow under the force of gravity into the runners and freeze therein before the injection pressure may take effect.

In the Barton system, Figures 35A and 35B, a channel is constructed in the movable die half at the end of the injection chamber to a space but a little thicker than the gate proper; the molten alloy is unable to flow into the channel proper before the pressure is applied; and any chilled metal is cleared away quickly by the erosive action of the molten alloy stream as the injection ram drives forward. This method is applicable to up-fed and down-fed die cavities, i.e., those lying above or below the horizontal center line of the injection chamber, and to internally gated parts, and requires only that the main runners join the annular feed channel around the sprue hole instead of joining the latter directly.

There is no real constriction of flow in this design since a foregate to the annular feed ring of, for example, 0.063" has nearly ½ square inch effective area when using a 2.5" diameter plunger, and this is greater than the section of any runner that would be generally used.

The Design of the Runner Proper

All runners should be of adequate cross-sectional areas in order to (1) per-

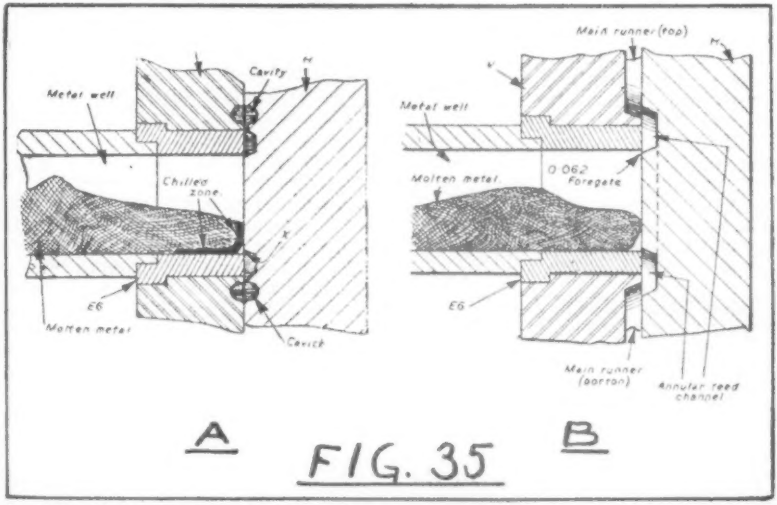


Fig. 35A. Sketch showing the Barton foregate system for feeding a multiple cavity die. The narrow gap, or foregate, between sprue and feeding channel will only allow the passage of metal under applied pressure. Fig. 35B. The foregate method applied to a multiple cavity die.

mit the unrestricted flow of a large mass of molten alloy; (2) reduce the chilling effect of the runner walls on the flowing molten alloy; (3) prevent a large mass of molten alloy from overheating some local die area; (4) decrease fractional losses; and (5) decrease turbulence.

Runner Size

The cross-sectional area of the runner, contrary to what is sometimes believed, need not be directly proportional to the weight of the part being die cast. The reason for this lies in the fact that the function of the runner is not merely to carry metal to the die cavity, but also to help maintain the thermal balance of the entire die. In the case of a multiple cavity die for casting a number of small die castings of thin sections, the heat evolved during the solidification of the die casting metal, will not be sufficient to maintain the die at the optimum temperature if the runner is proportioned to the weight of the casting. Under such a condition the outer portion of the runner itself may solidify too quickly and thus restrict the flow of the molten metal into the die cavity with the subsequent producion of imperfect die castings.

If, on the other hand, a large and thick-sectioned die casting is provided with a proportionate runner, the die temperature may be rapidly elevated to a point at which surface defects manifest themselves in the die cast part; in addition to which the increased time necessary for complete solidification of the runner will slow down production. For this reason, the cross-sectional area of a runner need seldom be less than 0.047 square inches.

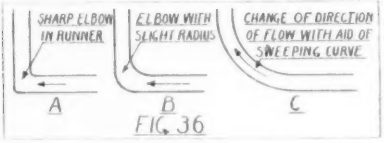


Fig. 36. Three possible elbows in a runner employed to change the direction of flow of molten alloy 90°: (A) A sharp angled elbow which should always be avoided. (B) An elbow with a radius that tends to streamline flow. (C) A curved elbow which permits most streamlined flow. (C) is preferable to either (A) or (B).

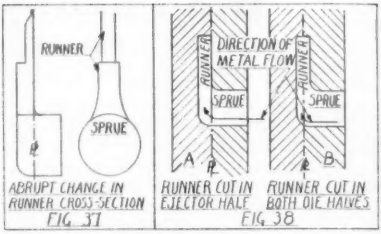


Fig. 37. A runner whose sectional area changes abruptly—a design to be avoided. Fig. 38A. Runner is cut into the ejector half of the die. Fig. 38B. Runner is cut into both halves of the die.

Approximately ⅜" x ¼", or ½ x ⅜" over the range of the casting is used.

Thus, for the die casting of parts weighing from one ounce to four pounds, a weight ratio of one to sixty-four, the variation of runner area is only one to four. The depth-to-width ratio of the runner is best held to about one to three; this is a good rule for most dies. Where the die castings are small, widely spaced, or remote from the sprue and of thin section, it is necessary to deepen and narrow, or widen and thin runner.

Shape

The shape of the runner is extremely important, i. e., both its cross-sectional shape and the shape of it over-all from sprue-end to feed-end.

A runner should not:

A. **Change direction abruptly,** as shown in Figure 36A, since this tends to: (1) create excessive and undesirable turbulance at this point; (2) create a pressure loss; and (3) cause welding of the molten metal to the die. A radius, as shown in Figure 36B, is better than none at all; however, a sweeping curve of large radius compared to the thickness of the runner, as shown in Figure 36C, is preferable.

B. **Change cross-sectional area abruptly** for the same three reasons stated above, and illustrated in Figure 37.

The runner cavity may be cut into either or both halves of a die, as in Figure 38. Generally, the runner is cut into only one half of the die block, Figure 38A, as this saves machining costs.

(Continued on page 148)

The Interchangeable Punch and Die Method Combined With Conventional Design and Construction Results In

Quicker Production

The one operation that is most common throughout sheet metal working manufacture is that of perforating — hole punching. Probably today's outstanding example of hole punching is represented by a television set chassis—aluminum sheet—embodying thirty to forty tube socket openings plus many dozen more for wiring, and coil, condenser and transformer mounts.

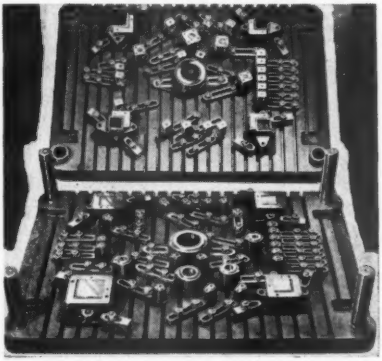


Fig. 1. A large die made up of an assembly of adjustable punch and die units on T-slotted upper and lower die set members.

In itself, hole punching is a simple enough production operation. Out of the press comes the sheet stock duly blanked and perforated. It is what goes into the press that is costly in time, money and skills; the precision dies that do the job with each stroke of the ram.

Today, particularly, getting production started is the tough job. Most plants are faced with much new work calling for new dies, additional skilled labor that, in some industrial areas, is next to unattainable, and withal, delivery time schedules calling for the almost impossible.

Photos courtesy of
S. B. Whistler & Sons, Inc.
Buffalo 17, New York

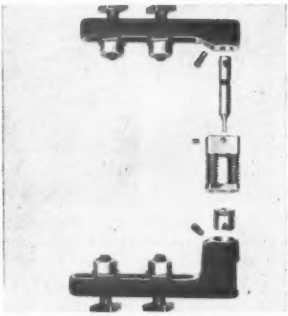
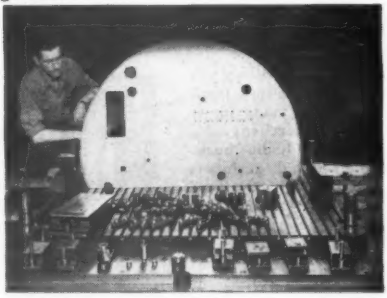


Fig. 2. This shows the relative positions of the components making up the adjustable units.

Further, with base operating costs being what they are, no plant can afford to have punch presses standing idle for days at a time waiting for new dies to be made up or for engineering changes to be executed.

The interchangeable press tool method offers appreciable relief from time and money bottlenecks on many counts. The merit of these tools increases as they can be employed to effect short cuts to actual production without any sacrifice in top quality standards, particularly when such time-saving methods can also account for

Fig. 3. By employing adjustable and interchangeable punch and die units, this mild steel section is perforated on the die in foreground.



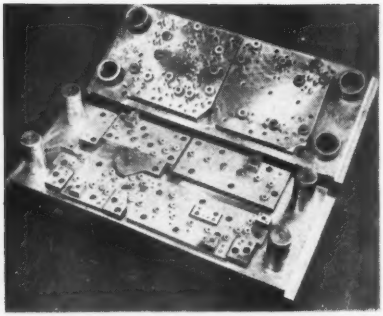


Fig. 4. An example of interchangeable punch and die bushings used in conventional die set construction; whereby permanent tooling benefits from quick-change punches and dies.

worthwhile economies in finished product costs.

The accompanying die photographs show how many answers to sheet metal perforating problems are presented by interchangeable punches and die bushings—equipment which can be used in several ways in making up complete dies, thus saving both time and money.

An idea of the design flexibility and working advantages that can accrue from a stock source of punches and dies can be had from Figure 1. This die, made up of Whistler adjustable punch and die units on a T-slotted die set, is ready for the press. Figure 2 is an "exploded" view of the adjustable elements and shows the T-slot bolts in the positions they assume when mounted in the upper and lower members of the T-slotted die set. Figure 3 shows a mild steel section as perforated by the die set in foreground.

Starting with a T-slotted die set of any desired size and destined for use in practically any type press, a complete die set can be made up ready for the press in a matter of hours. Changes as to position, size, or number of holes can be made without removing the die from the press. The standard punches and dies cover all round hole diameters from 1/32" to 3", and all of a like size are fully interchangeable. This results from the accuracy to which they are made and means that a given setup can be kept on long production runs. With these units, all materials up to ¼" thick mild steel are workable.

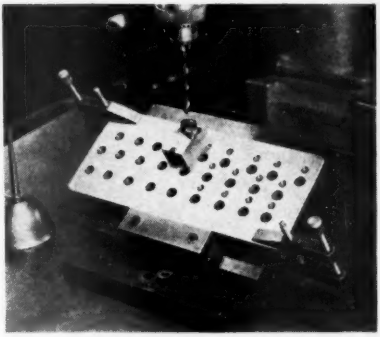
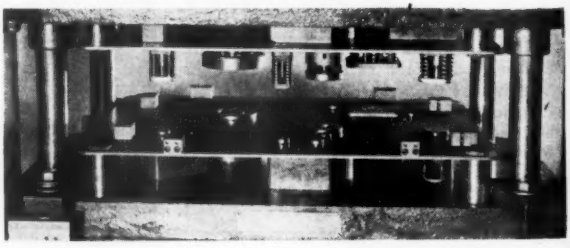


Fig. 5. After the steel mounting plates are jig-bored (receiver holes) in accordance with the quantity and size of punch and die bushings specified for the job, holes are drilled and tapped for the lock screws. These holes are accurately located by means of the jig shown here. There are jigs to fit the respective sizes of receiver holes, thus assuring the accurate drilling of the set screw holes.

Fig. 6. A finished die set mounted in a small press, and made up of stock interchangeable punch and die bushings and strippers magnetically mounted on upper and lower steel template members. The bare templates are all that have to be stored for future runs.



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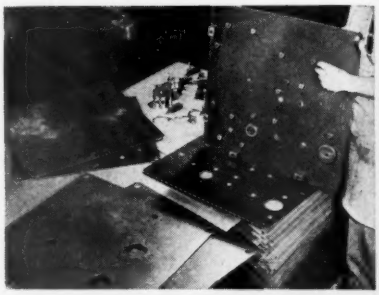
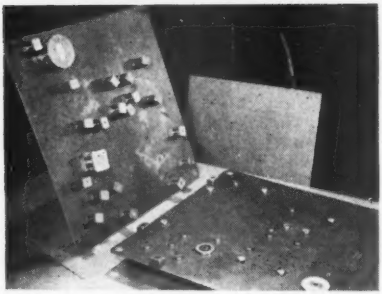




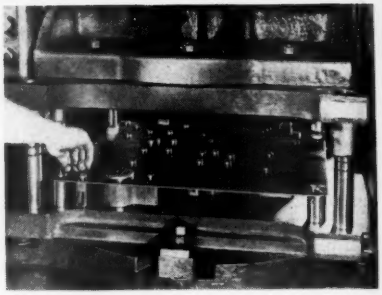


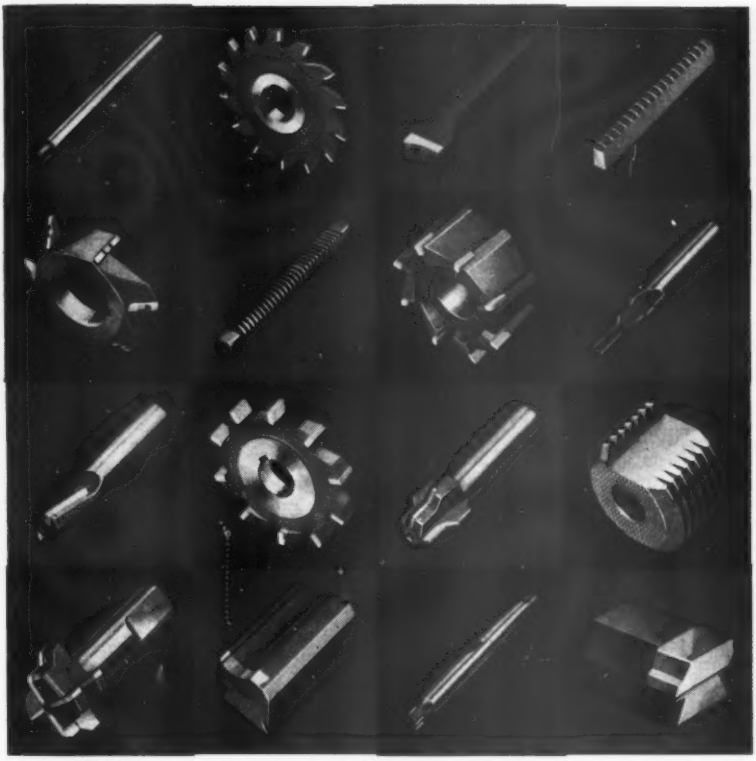
Fig. 7 (upper left). This shows the magnetic die retainers, complete with die bushings, being inserted in a die template. All that different perforating jobs require are the respective template pairs; the punch and die units being usable on any other jobs.
Fig. 8 (upper right). After the template assembly is completed, the next operation is that of placing snap rings around the die bushings. These serve to hold the retainers to template while the whole assembly is inserted in die set.
Fig. 9 (lower left). This shows a pair of template (punch and die) assemblies complete with magnetic retainers ready to be inserted in the die set.
Fig. 10 (lower right). The punch assembly template is secured to the upper die set member by the same method as shown here for positioning and fastening the die (lower) template.

The interchangeable punch and die bushings may be readily incorporated in the permanent type of die as designed and built into conventional die sets. Such a job is shown in Figure 4. "Receiver holes" in the upper and lower mounting plates are jig-bored to admit the specified sizes.

The setup for drilling and tapping the set screw holes is made easy by a jig that locates in the receiver holes, as shown in Figure 5. This method of die construction uses the same punches, die bushings and strippers as are used with the adjustable units of Figure 3.

Still another method of simplified die construction, of getting into press production on short order, and of conforming to engineering changes at minimum of expense and down-time, is by mounting the punch and die bushings on die templates by magnetic means.

Figure 6 shows a magnetic perforating die assembly in a small press. After templates are made for specific jobs, changeovers are accomplished in a very few minutes simply by unloading one template (the templates go into very compact storage) and loading another. Figures 7, 8, 9 and 10 show the several steps involved in setting up the magnetic units.



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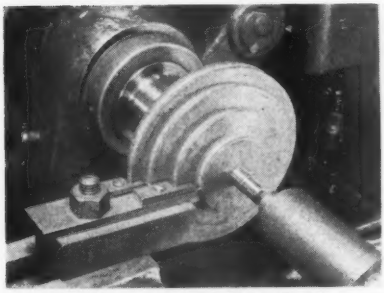
Plastic Pulley Cuts Cost of Drill Press



(Photo courtesy Synthane Corp.)

Use of plastic pulleys, molded from macerated, fabric-base Synthane, has reduced by two-thirds the cost of pulleys in the manufacture of precision drilling machines at the High Speed Hammer Co., Inc., Rochester, N. Y. Most of the saving reflects a reduction in machining costs. Only two machining operations, in the manufacturer's plant, now produce a finished pulley; the cast aluminum pulleys formerly used required seven.

The manufacturer attributes these savings partly to the ease with which the plastic may be machined, and partly to the form in which the pulley blanks are furnished by the fabricator. The machinability of the material, for example, allowed the drill press manufacturer to design an ingenious tool (illustrated) with four cutting edges, all permanently secured to cut four pulley grooves simultaneously and with a single setting.

This tool produces grooves with diameters of 1⅞", 2¾", 4 3/16" and 5 7/16" on the spindle pulley, and 2⅝", 3 23/32", 5 3/32" and 6" on the motor pulley. Before the pulleys are shipped to the Rochester firm, the hubs are drilled and tapped to take ¼" set screws, and the blanks are lathe-finished all over. Molded spindle holes of ½" diameter are reamed by the Rochester company to a tolerance of plus .0005" and minus .0000".

HPL Manufacturing Co. Expands Stamping Facilities

HPL Manufacturing Co., specialists in making stampings in small lots of 25 to 50,000, will soon move into a spacious new plant at 15210 Miles Ave., Cleveland.

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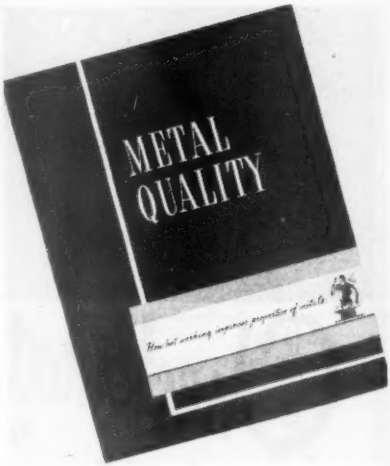
HPL's production during World War II was 100% defense sub-contracting. Defense orders currently are more than 33% of output.

Company operations in stamping are blanking, piercing, forming, drawing, tapping, countersinking, extruding, drilling, and stenciling. Owners are Melvin Lorentz and Ray Hedberg.



"Metal Quality," a 60-page reference data booklet, is available from the Drop Forging Association. Prepared for the users of forgings by the Association's Technical Committee, this booklet describes and illustrates the development of metal quality progressively throughout hot working operations. Drop Forging Association, 605 Hanna Bldg., Cleveland 15, Ohio, will honor all requests.

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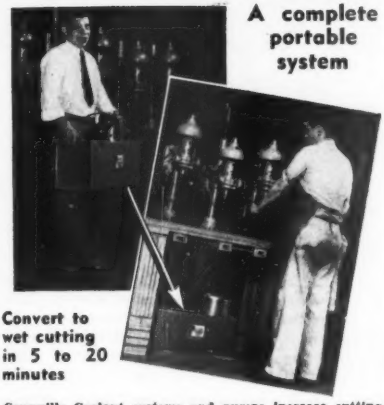

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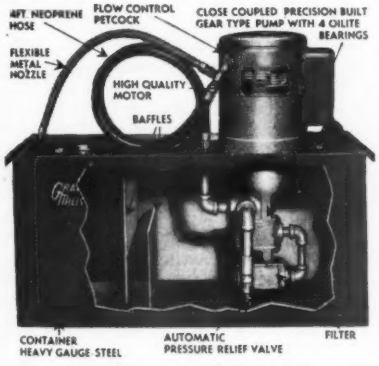

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SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS

A Method for Eliminating Milled Fixture Key Slots

The milling of conventional fixture key slots in the under side of fixture base plates can be a tedious and time-consuming operation involving unnecessary hours and high individual skills. Especially is this so when compared to a method of fixture base plate construction which requires no slot milling and which

by **Albert E. Schultz**
Jergens Tool Specialty Co.
Cleveland 10, Ohio

permits all work to be done in one setup and from the top side.

Even with painstaking skill and high caliber supervision, the production, and particulary inspection, of duplicate fixtures employing the milled locating slot presents operations desirable to avoid. This becomes of increasing importance as we deal with the type of fixture, so

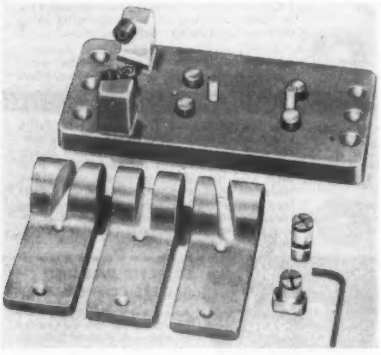

Fig. 1. The base for a fixture designed to accommodate any of the three castings shown below. These castings are of the right-hand, left-hand and straight design commonly encountered. Below at the right are shown the two fixture keys which serve to align the fixture with the milling machine table T-slot. The key shanks are inserted in the pair of jig-bored holes corresponding in angular relationship to the casting to be machined.

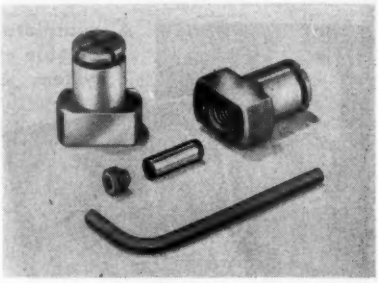

Fig. 2. A close-up of the fixture key design and construction. After the fixture key shank is inserted in the jig-bored hole, the set screw is tightened. This drives the steel pin into the slotted head and insures a tight secure fit of the shank within the hole.

common to the aircraft industry, which is to hold workpieces of a right-and left-hand nature.

A study of Figure 1, 2 and 3 will disclose the work simplification and accuracy that are gained by using fixture keys which are secured, in each instance, in a single, precision located and bored hole rather than in a milled base slot.

Figure 1 shows all of the parts involved in the job under discussion. At the top is the completed fixture base plate with a pattern of holes for the fixture keys rather than milled bottom slots. Below are shown three castings, having right-hand, centered, and left-hand slots, which were milled while held in position in the fixture plate. To the right, below, are the two fixture keys.

Figure 2 shows the details of the fixture key construction and operation. As the set screw is tightened, it drives the steel pin into the slotted head, resulting in a tight, secure fit of the shank within the bored hole.

Figure 3 represents (from top to bottom) three positions of the fixture base plate on a milling machine table for taking the left-hand, center, and right-hand cuts.

(Continued on page 92)

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SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS

Lapping Special Parts

Two special standard attachments for lapping machines recently developed, enable users to speed production and simplify handling of certain types of parts. These developments, the "roller bar" attachment and pnuematic lifts, were introduced to bring a wider range of work to the point of practicality in lapping.

In the lapping machine principle of operation, parts are held inside inexpensive micarta work-holders that fit into conditioning rings. These rings float on the lapping plate, and revolve on their own axis from the action of the rotating lap plate. Their function is to hold the work, and at the same time, continually condition the lap plate during machine operation, thus completely eliminating down time for dressing of the plate surface. Properly engineered compound-vehicle mixture is continuously agitated in a mixing tank, and flows automatically to the plate throughout the lapping cycle.

The conditioning rings are adjusted to maintain flatness of the plate by means of an overhead "spider bar" arrangement. This allows sufficient clearance for easy and rapid loading and unloading of the work.

Fig. 1. Lapping machine features automatic conditioning of the lapping plate by means of conditioning rings adjusted by overhead spider bar arrangement. Liquid lapping compound mixture is automatically fed to the lap plate surface by means of a feed track. (Photos courtesy Crane Packing Co.)

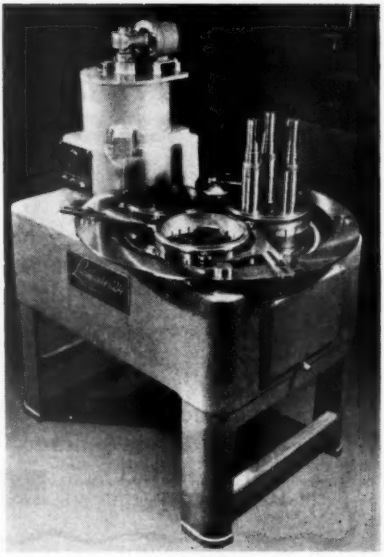

Fig. 2. Lapping machine is equipped with roller attachment for retaining and adjusting the conditioning rings. It allows the lapping of high parts and speeds the loading and unloading of parts heavy enough to lap their own weight.

The "roller bar" attachment was designed primarily to facilitate loading and unloading of tall or large parts. Instead of the overhead spider bar, it makes use of brackets mounted outside the circumference of the lap plate. Elongated slots allow adjustment of these conditioning ring holding brackets. Complete accessibility of the lap plate is afforded with this arrangement; height of parts is unlimited and in most cases, large heavy castings lap of their own weight.

When large numbers of small parts must be lapped, the pneumatic lift attachment will speed production by facilitating loading and removal of parts

(Continued on page 106)

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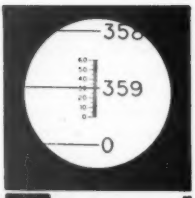

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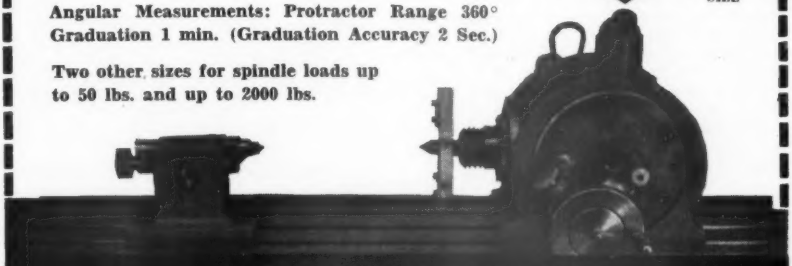

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SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS

. . . Fixture Key Slots

The three positions of the fixture are atained by securing the fixture keys in the respective pairs of jig-bored holes.

In construction, all the critical operations on this fixture base are performed in one setup, jig borer or horizontal boring mill, and the accuracy of the entire job is the accuracy inherent in these machines. This is obviously much simpler than the construction procedures involved for fixture bases having milled key slots, where precision work has to be done on both top side and bottom side. This necessitates the extra operation of machining one edge of the fixture in order to provide a reference surface from which to locate the bottom slots and the top work-holding elements, pins, guides and stops.

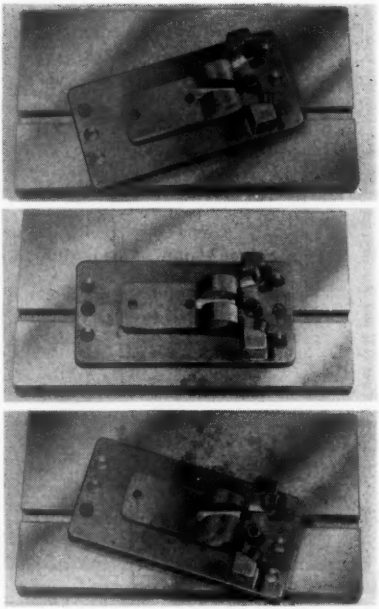


Fig. 3. This represents, from top to bottom, the three positions of the fixture base on a milling machine table, for taking the left-hand, center, and right-hand cuts. For each position, the fixture keys are located in a different pair of holes as shown. Laying out and boring the key-locating holes is a relatively simple jig-borer or horizontal boring mill job and is, consequently, of the highest order of accuracy.

The fixture keys are made with shank diameters of either ⅝" or ¾". The keys which fit table slots of ½" to and including ⅞" have ⅝" diameter shanks. For table slots 15/16" to and including 1 ⅛", the key shanks are of ¾" diameter. This simplifies design and construction because only two fixture hole sizes are involved. Also, it resluts in a given fixture being usable on machine tables of several sizes and permits taking fullest advantage of idle machines.

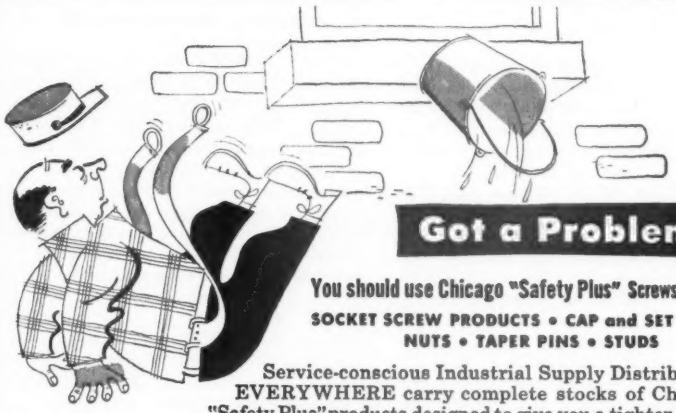
The same advantages prevail during tool inspection. Because all operations are performed from and upon the top, final inspection of a finished fixture is greatly simplified. The dimensions may be checked by the inspector with the piece still on the jig-borer or horizontal boring mill; or, if the work goes to the tool inspection department, the checking can be done without having to work both ways and around corners from a reference plane or edge.

"What's the Use—I'll Soon Be in the Army"

The attitude quoted above, which is so common on college campuses today, was criticized recently in a speech before Princeton University School of Engineering students by Harry A. Winne, vice president of General Electric Co. in charge of engineering policy. Mr. Winne urged students everywhere to rid themselves of this attitude and prepare themselves to help fill the impending shortage of engineers and scientists.

Mr. Winne, who recently served on a Scientific Manpower Advisory Committee of the National Security Resources Board, emphasized that board members realize the need for men to fill the armed forces, but that they also realize that men without adequate munitions and materiel are almost valueless.

He said: "My advice to college students is to quite worrying, and put your effort into the job immediately ahead of you, which is to get just as much education as you can . . . the vast majority of those who do go into the service will return to civilian life sooner or later, and I think most of them will be surprised at how soon that time will come."



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SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS

. . . Stainless Steels, from page 78

Tool Materials

Either the high speed steels, cast alloy steels or carbide tooling can be selected in the machining of the stainless steels; the choice being dependent upon the specific operation and the allowable speed at which the operation can be run with efficiency. The characteristic property often referred to as "cutting ability" is often stated as the ultimate desired in a cutting tool, however, it must be realized that this property is also accompanied by a low "toughness." Thus, although the carbide tools are considered the ultimate in cutting ability, the toughness factor is correspondingly low. Each of the above classifications are suited for certain types of work; thus, cutting ability is required for box tools, circular and dovetail form tools, and in other instances toughness is a pre-requisite in operations involving tapping or threading.

The sintered carbides, either the titanium, tungsten or tantalum carbides with or without cobalt, have good cutting ability; in general, their toughness is rather low. The cast tools of which there are a number of various compositions, have a greater toughness than the carbide tools with a corresponding decrease in cutting ability. The high speed steels are the most popular; the several different types of compositions available exhibiting various stages of toughness and cutting efficiency. In the cobalt types (9.0/12.0 cobalt) cutting efficiency is at a maximum, however, toughness is at the lowest ebb within the high speed bracket. In the molybdenum-cobalt and the tungsten cobalt (cobalt 5.0%) the toughness factor increases while the cutting efficiency decreases. Both the tungsten and the molybdenum types exhibit maximum toughness within this group. Of interest is the guide as illustrated in Table III in regard to tool selection.

Lubrication

A cutting fluid serves both as a coolant and as a lubricant. As a coolant it dissipates frictional heat that is generated in machining, and as a lubricant, it reduces frictional tendencies which in turn reduces overall heat generation. With stainless steel, both of these conditions are of equal importance. As a lubricant, the cutting fluid will overcome frictional resistance and with the higher film strength, it will prevent metal-to-metal contact which will prevent chip-welding and permit satisfactory tool life. As a coolant, the cutting fluid must dissipate heat so that dimensional accuracy can be assured in conjunction with satisfactory tool life, high production and uniform surface finish. Also, not only is the chemical composition and stability of the cutting fluid of importance, but also, the method of application is of equal importance as well as the volume.

Although the mineral-lard oils are used to some extent in the machining of stainless steels, those compounded oils containing either or both sulfur and chlorine are becoming quite prominent due to their anti-weld characteristics. The compounded oils being diluted usually with mineral oil will perform satisfactorily; the dilution being in accordance to the specific machining job. Carpenter Steel [5] has suggestions which can be used as a guide, thus:

1. "When using high speed, light feed automatic screw machines, principally for turning, forming and cut-off operations on the free-machining stainless, one part of sulfurized oil to five parts of paraffin oil is suggested.

2. "When using screw machines at normal or average speeds and including threading, tapping, drilling and milling operations on the free-machining stainless, a good starting point is a combination of one part of sulfurized oil to three parts of paraffin oil.

3. "For coarse bolt threading, nut tapping, broaching and pipe threading, two parts of paraffin oil to one part of sulfurized oil is recommended.

4. "In the machining of the austenitic grades of stainless steel with the exception of the free-machining type, a mixture of one part of a sulpho-chlorinated oil with one part of paraffin oil is suggested."

The use of the soluble oils is becoming increasingly popular where conditions

(Continued on page 98)

Military Procurement News

For the six-months period ending December 31, 1950, the military departments obligated $12 billion for the purchase of major equipment, supplies, military construction, and expansion of production facilities. This was an average of $2 billion a month. At the end of January, 1951, total obligations for major procurement were $16.4 billion, an increase of $4.4 billion for the month.

Of the seven-months total, Army obligations account for $6.3 billion, the Navy $3.4 billion, and the Air Force $6.7 billion. These figures include $1.7 billion obligated for Mutual Defense Assistance Program procurement.

While figures collected to the end of December, 1950, do not reflect the January build-up in contract awards, they do give an indication of the share of defense contracts going into small business. For the October-December quarter, $858,000,000 of all Army, Navy and Air Force contracts went to firms employing less than 500 persons. This was 50% more than the $576,000,000 purchased from small business in the previous quarter; and, for the six-months period to end of the year, was 21% of the value of all defense contracts.

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SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS

Handy Rotators for Large Tank Production

When welding and other operations are required on large cylindrical tanks, it is often highly desirable to mount the tanks so that they can be rotated during or between successive operations such as making circumferential welds, finishing internal or external welds, applying fittings, or painting. This makes down welding possible and brings work areas to the most convenient locations with minimum labor and delay.

by **Herbert Chase, M.E.**
Forest Hills, New York

To gain these benefits, The Pfaudler Company, fabricators of tanks for the processing industries, make use of rotators of the types here illustrated. The one in Figure 1 has a pair of rubber tired wheels near each end, both pairs being driven by roller chains from a gear reducer mounted between the pair of channels that form most of the frame. A motor drives the reducer and, when the wheels are driven, they cause the tank that they support to rotate slowly about its own axis. Some rotators have wheels with solid tires and some with pneumatic tires.

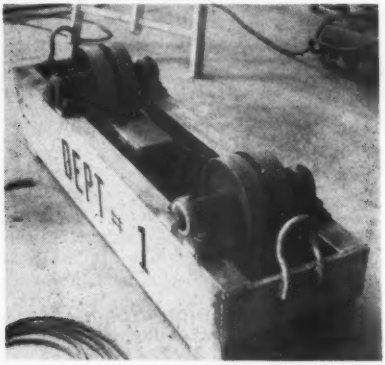

Fig. 1. Homemade power driven rotator for supporting and turning cylindrical tanks during or between welding or other fabrication operations in the Pfaudler Company's Rochester, N. Y. plant.

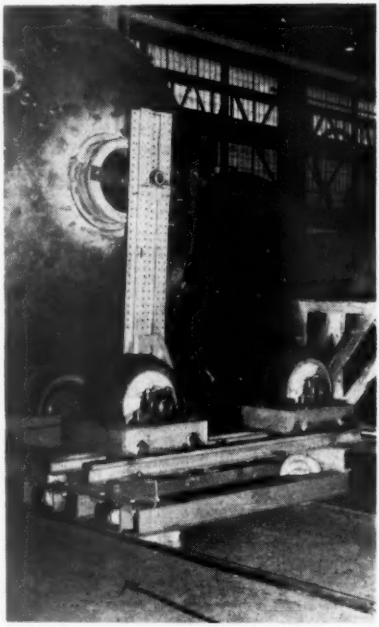

Fig. 2. In this support, the rubber tired driving wheels (not in use) are on a carriage movable axially. At the left is a belt that carries welding flux between the tank and a wheel during submerged arc welding of an internal seam.

In the Pfaudler plant, some rubber tired rotator wheels are mounted on carriages, as shown in Figure 2, and this makes it possible to shift the tank axially as well as to rotate it. For certain purposes, the carriage may serve as the base for a column on which an adjustable bearing is placed, as illustrated in

(Continued on page 133)

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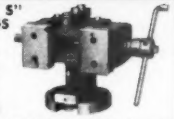

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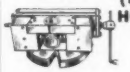

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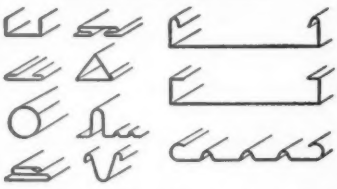

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SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS

. . . Stainless Steels, from page 94

TABLE III APPROXIMATE TOOL SELECTION CHART (2)

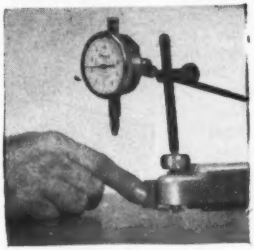
Tools and Operation Conditions	HIGH SPEED STEELS			Cast Alloy	Carbide
	Tungsten and Moly Type	Cobalt Type	High Cobalt Type		
Taps, Threading Dies, and Chasers — moderate or slow speeds, increase speeds for fine pitch threads	Excellent	.....	.....	.....	.....
Cut-off Tools, Circular or Blade Type — For average set-ups — medium or heavy feed, intermittent or heavy cutting at moderate speeds	Excellent	Good	Good	Fair	.....
Cut-off Tools, Circular, Blade or Insert Type — For special set-ups, employ medium or fine feeds at high speeds	.....	Good	Excellent	Excellent	Good
Form Tools, Circular, Dovetail or Flat — For average set-ups — roughing or finishing cuts, use heavy or light feeds at moderate speeds	.....	Good	Good	Excellent	Excellent
Box-Tools — **Special set-ups** — medium or light feeds and cuts at high speeds	.....	Good	Good	Good	Excellent
Low Speed Turning — For heavy feeds and cuts at moderate to slow speeds or intermittent cuts	Excellent	Excellent	Good	Fair	.....
High Speed Turning (Rigid set-up with ample tool support) — For medium and heavy cuts at moderate feeds and high speeds	.....	Fair	Good	Good	Excellent
Finish Turning — Very light depths of cut at fine feeds — for obtaining a fine finish	.....	Fair	Good	Good	Excellent
Reamers — For average set-ups — medium to fine feeds, speeds moderate	Excellent	Excellent	Excellent	.....	.....
Special Reamers — For special set-ups — medium to fine feeds at high speed	.....	.....	.....	Good	Excellent
Drills — For special applications — deep holes, etc.— use medium to fine feeds at moderate speeds	Good	Excellent	.....	.....	Excellent (Rifle Drills)
Drills — For average drilling conditions — medium to coarse feeds at moderate speeds	Excellent	Good	.....	.....	.....
Shave and Skive Tools (for sizing) — For finishing operations use fine feeds and cuts — moderate to high speeds	.....	.....	Good	Good	Excellent
Milling Cutting — For average cutting conditions	Excellent	.....	.....	.....	.....

The above table is offered as a guide and should be used with reservation since type of equipment, special tool grinds and individual efforts of machine operators and set-up men will vary.

(Continued on page 134)

New MITI-MITE *MAGNETIC HOLDERS*

A Third Hand for Machinists



New Heavy Duty Magnetic Base Holder for Indicators

Mounts equally well on flat or curved surface. Duplex type magnet . . . pull approximately 100 pounds. Eliminates hazardous clamping. Magnet has fingered type release for easy positioning. Holds any indicator up to 3 inch in diameter. Catalog No. 150—

$15.50.

Eliminates All Clamping

Miti - Mite Magnetic Holder mounts on any round or flat steel surface. Holds test indicators, saves time trying to find suitable place to clamp. Alnico magnet 50 lb. pull. Pull socket and swivel arm construction for versatile adjustment. Indicator holder stem 7/32" diameter which handles most indicators.

Concentrated Lighting

Miti-Mite Handi-Lite with magnetic base ideal for dark hard-to-get-at corners and jobs requiring concentrated lighting. Fitted with 40 W bulb, adjustable shield prevents glare in operator's eyes. Shield coated on outside with special rayon to prevent heat from being transmitted from bulb. Equipped with oil resistant plastic cord.

No. 100 Indicator Holder $7.50 No. 200 Handi-Lite $8.50
No. 300 Combination of Both $15.50

Order from your mill supply dealer or send order with name of your mill supply dealer. Ask for bulletin *No.* 602.

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WHITNEY - JENSEN PRODUCTS
41 YEARS EXPERIENCE

Nos. 28, 29, 58, 68
Deep Throat, Toggle Action
FOOT PRESSES

The deep throats (7", 10", 18" and 24") and powerful punching action of these foot presses permit the handling of a wide variety of work. All sizes, with 5 ton capacity, punch a 2" hole through 16 gauge mild steel.

Length of stroke—1"
Height of throat—6¾"

WHITNEY METAL TOOL COMPANY
724 FORBES STREET • ROCKFORD, ILLINOIS

SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS

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QUICK-PIC

FRICTION SAWING
Use of Tannewitz High Speed Band Saws for trimming formed parts and hundreds of other cutting jobs is described in this interesting, 32-page booklet.
Circle No. E5.

WHEEL DRESSERS
Eight pages containing brief descriptions of J & S radii and angle dressers, jaw clamps, vise jaws, parallels, cutting tools and other time-savers make up this folder.
Circle No. E6.

BROACHING
Zagar Engineering Manual No. 1 includes dimensional drawings on all models of broaching machines, collet fixtures and multiple spindle gearless drill heads, plus action photos.
Circle No. E1.

SHEARS
Design and operating features of The Cincinnati Shaper Company's complete line of shears are detailed in the 32-page, liberally illustrated Catalog S-5.
Circle No. E2.

MACHINE TOOLS
Lathes, shapers, drill presses and many other Atlas machines are pictured and described in extensive Catalog M50. This catalog gives full specifications.
Circle No. E9.

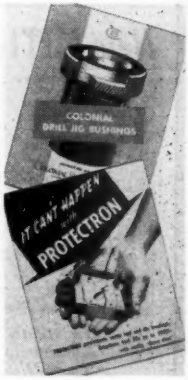
DIES
Whistler Adjustable Perforating Dies, for perforating materials up to and including ⅛" mild steel, are the subject of detailed Catalog No. 48. There are 40 pages of useful data.
Circle No. E10.

DRILL BUSHINGS
The "single-flip" catalog of Colonial Bushings, Inc., provides all vital dimensions and information on standard drill jig bushings and liners. A time-saver!
Circle No. E3.

"PROTECTRON"
This informative, illustrated four-pager fully covers "Protectron," designed primarily to protect tools, dies and machinery against breakage due to mechanical overload.
Circle No. E4.

GROUND FLAT STOCK
Three types of Brown & Sharpe ground flat stock are described in a current folder. A complete listing of all sizes — including 24 new sizes—is contained in the folder.
Circle No. E11.

WHEEL BOND
"79E" is an exclusive new Chicago grinding wheel bond that can give a 5-10% boost to your grinding and finishing output. This pamphlet has all the facts.
Circle No. E12.



COLLET CHUCKS
Getting full value from your investment in toolroom and engine lathes? If not, this Harding-Sjogren Speed Chuck bulletin may be just the answer. Consists of eight illustrated pages.
Circle No. E7.

SCREWS
The 48-page Self-Tapping Screw Bulletin of Parker-Kalon Corporation gives detailed application information, describes and pictures modern assembly methods.
Circle No. E8.

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CATALOGS

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LIFT TRUCKS
Towmotor's Standard Specifications Folder contains full data on fork lift trucks, tractors and electric pallet trucks. The facts are concisely presented.
Circle No. E13.

PUNCHES
A complete range of punch styles and sizes is presented in the current Pivot catalog and price list. These punches are straight-ground, HHS and are whipsleeve supported.
Circle No. E14.

GRINDERS
Hisey-Wolf offers comprehensive Catalog No. 71, covering an extensive line of electric grinders and buffers. There are 34 pages of descriptions and photos.
Circle No. E21.

DIAL FEED TABLES
These A. K. Allen Co. tables have an accuracy of indexing guaranteed to ±.002" of nominal measured at the periphery of the 11" nest plate. A brochure contains full data.
Circle No. E22.

END-FINISHING
Typical application photos and tooling diagrams highlight a new four-page bulletin on Pines Bench-Type End-Finishing Machines. The operating principle is described.
Circle No. E17.

PRESSES
Economies and advantages of the Brandes Automatic Press are pointed out in a well illustrated, eight-page bulletin. Some typical stampings are pictured.
Circle No. E18.

PORTABLE TOOLS
This condensed catalog describes portable drills, saws and disc sanders in the Cummins line. A list of accessories is also included in the catalog.
Circle No. E15.

JIG BORER
The largest of all P & W Jig Borers, the No. 4E, provides the subject matter for Circular No. 530. This publication contains photographs, specifications and design features.
Circle No. E16.

HARDNESS TESTER
A new model of the Ames Portable Hardness Tester is featured in this six-page bulletin. The instrument may be carried to the work for quick, accurate, on-the-spot testing.
Circle No. E23.

BRAKE DIES
Long-lasting, forged-steel brake dies are a Service Machine specialty. This four-page circular gives the "how" and "why" of 32-page Semco die service.
Circle No. E24.

FLEXIBLE SHAFT MACHINES
Brand-new Catalog 180-1 shows the complete Foredom line of machines for every "small-work" job of grinding, finishing, deburring, etc.
Circle No. E19.

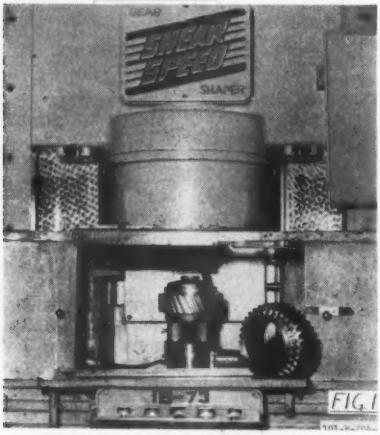
DRILLING UNITS
"Five steps to faster small-hole drilling" are outlined in the latest Electro-Mechano Company publication. Specifications and dimensions are given for these automatic units.
Circle No. E20.

SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS

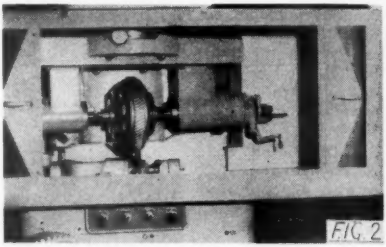
Short Run Mass Production

More and more, mass production methods are being adapted to job-lot or shorter run production of miscellaneous parts in order to increase output per machine and man hour. Typical example is in the manufacture of gears and tractors at Caterpillar Tractor Company.

Figure 1 shows a Shear-Speed gear shaper which can turn out anywhere from 45 to 60 tractor gears per hour being used for interchangeable production of eleven different gears at Caterpiller. Eight of these gears are used in one transmission; nine of them—with duplications, of course—in another transmission. Average changeover time is one hour when the complete cutter head is removed. When it is necessary only to change the blades in the head, changeover time is cut to only 35 minutes.



(Photos courtesy Michigan Tool Co.)



Shown in Figure 2 is an Underpass gear shaving machine which is used in the production line, producing replacement, experimental and timing gears. A modified underpass movement is used on this machine, shaving of the timing gear shown being at the rate of fourteen gears per hour, although the gears are pre-hardened to 363 Brinell before shaving. Short changeover time is, of course, an important characteristic.

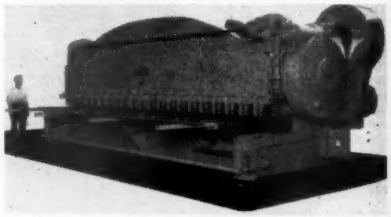
★ ★ ★ ★ ★ ★

Shearing 20′ of ½″ Plate

What is belived to be the longest ½″ shear ever built has been produced for the Butler Manufacturing Company of Galesburg, Illinois.

This shear, with a capacity of 20′ of ½″ mild steel plate, weighs over 135,000 lbs. and has a 24″ throat or gap and a 48″ range of the ball bearing back gage. It can operate at a speed of 20 strokes per minute.

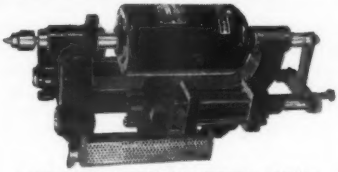
The plate to be sheared is secured by hydraulic hold-downs capable of exerting a holding force of over 70 tons. The hold-down pistons are equipped with automatic type piston rings for prolonged life and have vacuum pump arrangement that insures against oil leakage.



(Photo courtesy The Cincinnati Shaper Co.)

"Speed-Right" DRILLING MACHINES .004" to .156"

INCREASE PRODUCTION . . .



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- FINGERTIP VARIABLE SPEED
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Write for "Five Steps to Better Drilling"

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For Tool, Die, Pattern or Template layout on metal . . . Quick identification of bar stock, sheet, strips or parts . . . Shows up in sharp relief—dries instantly . . . Write for sample and circular on company letterhead.

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Most accurately graded abrasive ever produced. Saves over 78% in labor and time. In all grit sizes as fine as .0001" Available in ophthalmic-tipped tubes or in new applicator gun that delivers accurate minimum quantities to individual jobs and eliminates all waste.

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"STAR DUST"

SEE ADVERTISERS INDEX, PAGE 118, FOR KEY NUMBERS

. . . A-Bomb, from page 66

One fact that stands out from last war experience is that arched or rounded structures almost invariably stand up to anything but a direct hit. The Germans took advantage of this structural immunity to blast by building reinforced concrete cylindrical structures, pointed at the top, as a shelter for personnel and records during attack.

What Should We Do Now?

These, then very briefly, are the powers and limitations of the atomic bomb threat. More detailed descriptions may be had from various publications listed at the end of this article.

With the problem outlined, the question is, What should we do to be adequately prepared in the event of an A-bomb attack?

First, we must have thorough knowledge, not only of our plant, but of the surrounding area—neighboring plants, community, highways, and available aid. In setting up an emergency preparedness program, S. C. Rothmann, director, Loss Prevention Engineering Department, American Cyanamid Company, Linden, N. J., one of the most energetic and advanced planners for plant protection, suggests the following steps:

(a) Form a planning organization (size and composition depending on plant size, location, products made, etc).

(b) Organize a logical indoctrination program starting with top management and down the line until every employee is reached.

(c) Make an overall plant survey of your hazard problems from standpoint of fire, blast, toxic and corrosive materials handled.

(d) Simultaneously, take an inventory of all protective, preventive equipment needed.

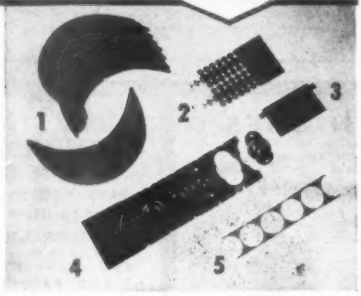
(e) Review and bring up to date all regulations pertaining to prevention of loss of life, limb or property.

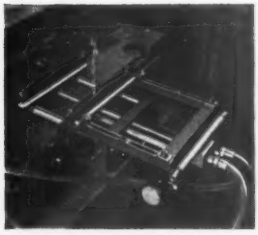
(f) Divide your plant into evacuation areas. Also evaluate and designate plant buildings which might be adapted to or converted into shelters; check availablity and adequacy of fire prevention and fighting facilities, first aid, demolition, etc.

(g) Enlist cooperation of neighbor plants, civil defense, municipal officials, etc. Find out what they are doing and have available for an emergency. Let

Feedmaster Automatic Air Feed
FEEDS THEM ALL
and switches jobs in minutes alone!

1) Feeds 12 layers of cardboard per stroke.
2) Feeds steel strip to piloted multi-stage die making thumb tacks.
3) Feeds slippery, oily nickel-plated steel to .002" without pilots.
4) Feeds steel through 4-stage die without piloting.
5) Feeds long thin fibre strips without pilots.





NO MORE TEDIOUS SET-UPS—just space stock guides, adjust jaw clearances and rotate micrometer dial to obtain exact stroke length; varies stroke in .001" increments. No wasted set-up time, no more slow costly hand feeding! Handles material from foil to two by fours! Costs only ⅓ usual price—IMMEDIATE DELIVERY! WRITE FOR DETAILS!

GREAT WESTERN TOOLS, INC. 3314 N. San Fernando Blvd. Burbank, California

them know what you are doing and have available.

Plant-Wide Job

The big important fact in effective emergency planning is that it is a plant-wide job. Everyone has an interest in it because his life is at stake in the event of an attack. The Bomb will not differentiate between an obscure sweeper or a member of the top ulcer brackets of management. Therefore, an important member of the emergency planning council is an officer of the local union.

The goal of emergency planning is to save lives and to maintain production. This can only be accomplished by a smoothly functioning organization in which every man knows what the danger is, what he has to do, and when to do it.

Bibliography

"The Effects of Atomic Bombs on Hiroshima and Nagasaki," USSBS report; "National Security Factors in Industrial Location," NSRB pamphlet; "Damage from Atomic Explosion and Design of Protective Structures"; Medical Aspects of Atomic Weapons"; "Effect of Atomic Weapons"—publications available at Government Printing Office, Washington 25, D. C.

"Principles of Plant Protection," MB, Dept. of Defense.

"Manual of Basic Training, Vol. II, Atomic Warfare," British Information Services, 30 Rockefeller Plaza, New York 20, N. Y.

"Plant Protection for National Defense," Detex Watchclock Co., 76 Varick St., New York, N. Y.

Eutectic Welding Is 10 Years Old

Eutectic Welding Alloys Corp., of New York City, this year well celebrate its first decade of operation as an institution devoted to the sole purpose of developing and supplying specialized welding rods and electrodes for unusual joining applications.

The company recently announced the completion of a new Engineering and General Offices Building. This addition will expand the free Consultation-Demonstration Service Eutectic now renders through its 200-man field force; it will also help to disseminate up-to-date technical information to welding engineers, metallurgists and the men in the shop.

Production of welding rods, too, has been enlarged to meet the heavy demands of industry. Completed and in operation since October, 1949, the company's plant at Flushing, N. Y., contains the most modern, specialized equipment available. It has increased the potential capacity to more than five times that of the former plant.

NEW simple accurate versatile Odee-HONE
For honing all types of External Cylindrical Surfaces. A single tool for all parts from ½" to 2½" in diameter.
GENERATES ACCURATE SIZE, ROUNDNESS, STRAIGHTNESS, AND FINISH ON
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Pistons and piston rods
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similar parts
For complete information write or call—
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8100 Schoolcraft Avenue • Detroit 4, Michigan

SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS

. . . Lapping Parts, from page 90
and work-holders. Each conditioning ring and pressure plate unit is individually raised by a pneumatic lift. When the automatic lapping cycle stops, each lift is quickly raised by pneumatic pressure, lapped parts are removed and preloaded work-holders are placed in position; all with a minimum of time. The pneumatic lift eliminates more than two-thirds of the handling costs when large numbers of parts must be lapped.

HARDENED and GROUND HSS BLANKS
Any decimal diameter to ½" —in any length. Mirror finish surface to gage tolerance. Many uses — punches, gages, measuring wires, special tools, etc. Quick delivery.
Write for price list D-1.
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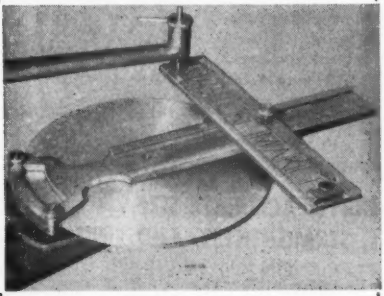

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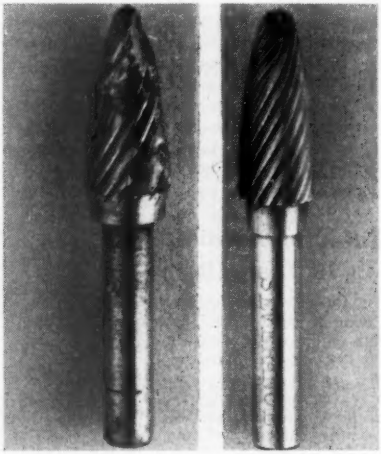
Carbide Tool Conservation

Due to the current heavy demand for carbide products running far in excess of present available supply, regrinding and repairing services should be considered by all those interested in carbide midget mills, burs and countersinks in defsense or civilian production.

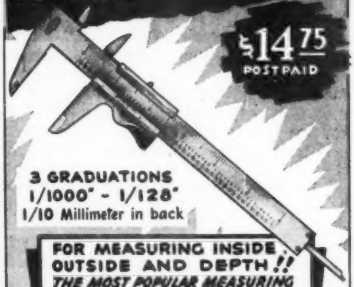


(Photo courtesy Severance Tool Industries Inc.)

Dull, broken, discarded, carbide tools can be reworked so as to give new tool performance. The photograph illustrates how a damaged tool can be reworked to form a tool of new shape and size. Worthy of note is the suggestion that many times a new carbide tool, for which there is no current need, can be reworked into a tool to meet a present urgent requirement.

It is urged that broken pieces of carbide of any kind be retained because they can be used in reworking and repairing carbide tools.

Solid carbide tools can prove valuable: for when the tool, through many grindings, has become too short or too small to use, the remaining carbide can be brazed onto steel and a new tool head formed on the carbide of the old shank.

MAUSER "THE ORIGINAL"
MAUSER-PRECISION VERNIER CALIPER
$14.75 POSTPAID

3 GRADUATIONS
1/1000" - 1/128"
1/10 Millimeter in back
FOR MEASURING INSIDE, OUTSIDE AND DEPTH!!
THE MOST POPULAR MEASURING TOOL IN AMERICA... USED BY THOUSANDS OF MECHANICS DAILY!
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COMPLETE LINE OF PRECISION INSTRUMENTS
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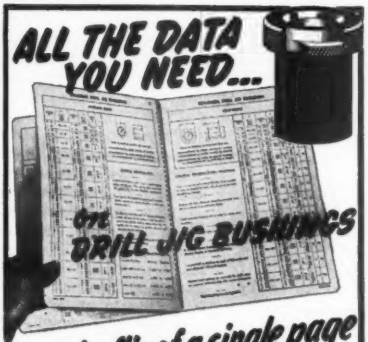
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COLONIAL BUSHINGS INC.
P.O. BOX 37 HARPER STATION
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Use KIPP AIR GRINDERS if you want to GRIND —not just rub!

MODEL JA
50,000 R.P.M.
$42.00
IN U.S.A.
Weight 12 ounces; length 6¾ inches; chuck size ⅛ inch. Wheel guard removed for better illustration.

The RPM's stay up while grinding . . . not only when the grinder runs idle.

It is an established fact that surface speeds must stay up to approximately a mile a minute if you want to grind — not just rub. Every mechanic knows this, but inexperienced buyer may order tools that maintain proper grinding speeds only when running idle. The speed of Kipp air grinders drops but slightly when put to work. That means better work—longer wheel life.

Buy Kipp air tools for best results, lower prices.

MADISON-KIPP CORP.
212 Waubesa St., Madison, Wis., U.S.A.

• Skilled in DIE CASTING Mechanics
• Experienced in LUBRICATION Engineering
• Originators of Really High Speed AIR TOOLS

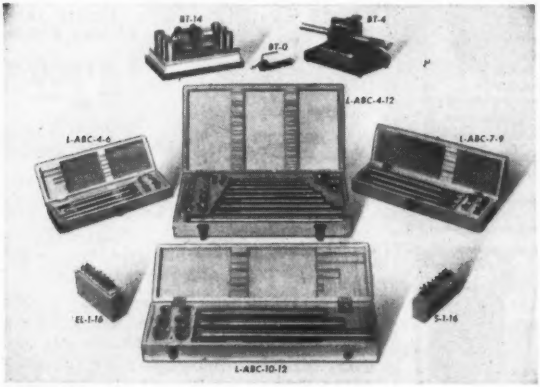
SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS

PUBLICATION

Keep Informed! CATALOGS • BULLETINS • SPECIFICATIONS

Any Quantity of Identical Lengths of Bar Stock are cut automatically in a Wells No. 12 Heavy Duty Metal Cutting Band Saw equipped with a Wells-O-Bar Feed Master. This money- and time-saving combination is fully described in current literature.
Inform-A-Gram No. B1.

A New Manual on Finishing contains descriptions of Walls' Standard D-4 Abrasive Band Grinder and other styles and sizes. The D-4 is a streamlined, bench-type grinder that is equipped with improved band tension control and specially designed protective motor hood.
Inform-A-Gram No. B2.



NOW, Bokum Lathe Tools conveniently put up in sets

Sets are made up in four different combinations of Styles A, B and C tools. Three sets consist of 3 sizes each of three style cutters with interchangeable shanks, really making nine tools in all. The fourth set comprises a combination of all the above tools, making a total of 27 tools.

All the tools (cutters and shanks) are compactly arranged in a sturdy wooden box—always ready for use and protected against damage or loss.

Send for Supplement E-1 to catalog sheet E-1139-6 Lathe Tool Holder and Accessories Catalog E-483

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SINGLE POINT BORING TOOLS—INTERNAL THREADING, BOTTOMING AND FACING TOOLS—CARBIDE TIPPED TOOLS

Siewek Drill Jig Template Sheets are now available. They are full-size, individual template tracing sheets covering Rack and Pinion and Spring Type Drill Jigs. Siewek products not covered in individual template sheets are covered in tabulated form in Catalog No. 7. Requests for the full set of individual template sheets, or for Catalog No. 7, should be addressed on company letterhead to SIEWEK TOOL CO., 2862 E. Grand Blvd., Detroit 2, Mich.

Cary Gages of All Types are now being exclusively distributed in the United States by Kalex Corp. These Swiss-made instruments include plug gages, ring gages, snap gages, gage blocks, dynamometers, comparators, etc. Gages are offered in steel, carbide or ruby. Fully descriptive, illustrated literature is available from KALEX CORP., 305 E. 46th St., New York 17, N. Y.
Inform-A-Gram No. B3.

Three New Hi-Speed Automatic Presses are described in Di Machine Corp. literature. These efficient and accurate presses are offered in 5-, 8- and 12-ton models, featuring variable speed drive, clutch and automatic brake release, and positive knockout for compound dies.
Inform-A-Gram No. B4.

All the Facts on Brighton Nu-Process and Uni-Quality are contained in a detailed catalog from the manufacturer of B-Right-On Socket Screws.
Inform-A-Gram No. B5.

PREVIEWS

Circle postage-free Inform-A-Gram Key Number for your request

A New Three-Color Brushing Catalog, designed to simplify selection of the best brush for the individual job, has been issued by The Osborn Mfg. Co. Catalog No. 210 contains 76 pages and cover, is 8½" x 11" and presents numerous illustrations of industrial brushing operations in addition to photographs and descriptions of Osborn's complete line of power, paint, varnish and maintenance brushes. THE OSBORN MFG. CO., 5401 Hamilton Ave., Cleveland 14, Ohio.
Inform-A-Gram No. B6.

The Jo Line Drill Press Turret Head permits three spindle operations on a one-spindle drill press. It offers single action indexing and greatly increases man-hour production on all drill press operations. A fully descriptive catalog sheet on this turret head may be had from JO MFG. CO., 8442 Otis St., South Gate, Calif.
Inform-A-Gram No. B7.

You Can Save Time and insure greater accuracy on all types of shop work beyond the capacity of regular 6- or 8-foot tape-rules with the new Mezurall "10-Footer" Tape-Rule. Lufkin Rule Co. literature will give you the whole story.
Inform-A-Gram No. B8.

Comprehensive Catalog 16 of Severance Tool Industries, Inc., describes midget mills, junior mills, lab mills, deburring cutters, countersinks, etc. These cutters are available in both high speed steel and carbide.
Inform-A-Gram No. B9.

The New Cartridge Type Packing Gland, combining double bearing surface, low friction ram seal, and a ram wiper into a single compact unit, highlights Pemaco Hydraulic and Air Cylinders. Petch Mfg. Co. will provide complete information and engineering data.
Inform-A-Gram No. B10.

New Vulcanaire Spindles, for all high speed, high precision grinding, are presented in Vulcan Tool Co. literature. Infinite speeds are controlled from 30,000 to 65,000 rpm. Uses and advantages of these new spindles are pointed out in the literature.
Inform-A-Gram No. B11

PEMACO HYDRAULIC AND AIR CYLINDERS
with the NEW
Cartridge Type Packing Gland

Designed to J. I. C. Hydraulic Standards

Pemaco Hydraulic Cylinders are soundly engineered—give long life and top performance. The steel ram is hardened to 50.C Rockwell, ground and lapped. NOW the Pemaco has the first self-contained Cartridge Type Packing Gland.

This new Pemaco "EASY-PAK" Gland is designed to comply with J.I.C. Standards. It combines double bearing surface, low friction ram seal, and a ram wiper into a single compact unit. Easily maintained, the Pemaco "EASY-PAK" Cartridge Type Packing Gland can quickly be replaced in most cases without removing the cylinder from the machine — and by inexperienced help — greatly reducing machine down-time.

Pemaco "EASY-PAK" Cartridge Type Packing Glands are manufactured for both hydraulic and air cylinders.

PETCH MANUFACTURING COMPANY

Write for complete information and engineering data.

36100 HARPER AVE.
MT. CLEMENS, MICH.

SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS

Revere Fisher Drill Jig Bushings, with cores made of super pressed, high chrome, high carbon steel, have all the accuracy of solid type bushings. The wearing surface is from .030" to .050" thick. Literature is available.
Inform-A-Gram No. B12.

Gorton Tracer-Controlled Pantographs and Duplicators enable you to obtain high surface finish results from spindle speeds up to 45,000 rpm. The extensive Gorton General Catalog is being mailed.
Inform-A-Gram No. B13.

The Wilder "Vertical Design" Micro Projector features: a horizontal stage; a comfortable inclined screen; micrometer cross-slide adjustments; and, most important of all, optical projection that detects errors. George Scherr Co., Inc., offers an illustrated bulletin.
Inform-A-Gram No. B14.

Standard Jig and Fixture Parts are presented in an interesting, 52-page book of drawings, specifications and prices issued by Noble & Stanton, Inc.
Inform-A-Gram No. B15.

Honan-Crane Hydraulic Oil Purifiers are featured in a new eight-page bulletin entitled "Stop Downtime and Expensive Repairs on Hydraulic Presses, Machine Tools, Etc." It presents correct methods and equipment to maintain hydraulic oil in its original condition for infinite periods under the most severe operating conditions. HONAN-CRANE CORP., 208 Indianapolis Ave., Lebanon, Ind.
Inform-A-Gram No. B16.

The Hardinge Tool Room and Production Lathe is covered in illustrated Bulletin HLV. Features of this lathe include variable feed drive for carriage and cross-slide, and variable speed drive for headstock spindle.
Inform-A-Gram No. B17.

The 10" Swing, 1" Collet Capacity South Bend Precision Lathe, engineered for the most exacting close-tolerance machine work, is the subject of newly-released literature.
Inform-A-Gram No. B18.

"De-Sta-Co" Toggle Clamps are made in more than 40 models to solve any problem in production work-holding. The current Detroit Stamping Co. catalog contains descriptions of the whole line.
Inform-A-Gram No. B19.

Type TD Twin Wheel Tool Grinder is fully described in The Standard Electrical Tool Company's Bulletin 18. With this heavy duty machine, there is but one step from rough to finish grind.
Inform-A-Gram No. B20.

The New DPS Nut Driver Model A Power-Screwdriver and the DPS Hopper Unit are among the power-driven production aids described in the latest, 40-page catalog of Detroit Power Screwdriver Co.
Inform-A-Gram No. B21.

IT PAYS TO MEASURE CUTTING FLUID PRICE IN TERMS OF PERFORMANCE

Hob Life Increased 100% with Stuart's THREDKUT

SOMETIMES the best cutting fluid for a job costs more per gallon, sometimes less. But the *real cost is in its use!* Here's an example:

A manufacturer hobbing large gears (63 teeth, 6" face, 2⅛" pitch, 3854 forging—290 to 310 Brinell) was paying 44¢ per gallon for cutting oil and producing 3 gears per tool grind. Now, using a blend of Stuart's THREDKUT at 54¢ per gallon he gets *6 pieces* per tool grind.

THE INCREASE IN HOB LIFE and PRODUCTION plus THE DECREASE IN LABOR makes the Stuart oil far, far cheaper to use!

Write for literature and ask to have a D. A. Stuart Representative call at your plant.

D.A. Stuart Oil Co.

2729-37 S. TROY ST. ● CHICAGO 23, ILLINOIS

Model 2V-18 Double Disc Precision Grinder is described and pictured in an eight-page, two-color catalog, No. A-151, released by Gardner Machine Co. This machine is used for grinding two flat surfaces simultaneously on workpieces such as coil springs, carbon brushes, ceramic materials and other small parts. GARDNER MACHINE CO. Dept. TDJ, Beloit, Wis.
Inform-A-Gram No. B22.

DUSTKOP Dust Collectors are the subject of a new 38-page catalog. The complete line is described, and illustrations are included of almost every typical dry grinding dust control problem. Write for a copy to AGET-DETROIT CO., 213 Main St., Ann Arbor, Mich.
Inform-A-Gram No. B23.

Scully-Jones "JA" Floating Holders. Bulletin No. 8-50 outlines a complete range of sizes, specifications and prices. These holders are used for accurate drilling, reaming and tapping operations.
Inform-A-Gram No. B24.

Cincinnati Projecto-Form Grinding Machines provide the subject matter for Catalog M-1612. Complete specifications are given for these machines, which accurately grind tool and die parts.
Inform-A-Gram No. B25.

Dayton Rogers Die Cushions are self-contained units, quickly installed on any punch press and adaptable to all deep drawing press operations. Catalog No. 100-1 has all the facts.
Inform-A-Gram No. B26.

No. 17 Etalon Universal Vernier Caliper is an all-purpose instrument with a precision locking device and a capacity of 6". A descriptive bulletin is offered by Alina Corp., American representatives.
Inform-A-Gram No. B27.

"Speed-Right" Drilling Machines, featuring finger-tip variable speed, fast approach air feed, and hydraulic feed adjustment, are described in a new Electro-Mechano Co. publication entitled "Five Steps to Better Drilling."
Inform-A-Gram No. B28.

Horberg Drill Size, Pin Gages provide unlimited time- and cost-saving advantages in center and location finding, hole or slot gaging. Descriptive literature will be mailed by The Horberg Gage Co.
Inform-A-Gram No. B29

Precision Die Sets, die springs, leader pins and bushings, stripper bolts, screws and many other items are fully described in the comprehensive, 112-page Catalog No. 50 published by E. A. Baumbach Mfg. Co.
Inform-A-Gram No. B30.

DoALL "Cool Grinding" (coolant-through-the-wheel) is a patented technique used with a DoALL Surface Grinder to provide faster more accurate, better finishes. Detailed literature is available.
Inform-A-Gram No. B31.

FINGERS
must be saved-
KEEP THEM OUT
OF PRESSES with
LITTELL
30 Pres-Vacs cost less than the average cost of only one press accident.
Pres-Vac
Operated by Compressed Air
SAFETY FEEDERS
• Blanks are fed from a distance of 14 inches
• Eliminates need of putting fingers under press ram
BOOST PRODUCTION 20% TO 100%
— Reported by users
ELIMINATE DIE BREAKAGE
— Assures Feeding Blanks One at a Time
CUT INSURANCE COSTS
— Fewer Accidents Mean Lower Premiums.
Littell Pres-Vac Safety Feeders are made in Single and Multiple types in a variety of cup sizes and styles.
F.J. Littell MACHINE CO.
AIR DIVISION
4197 RAVENSWOOD AVE., CHICAGO 13, ILL.
— District Offices: Detroit and Cleveland —
Write for Catalog

SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS

A Screwless Vise that can save you up to 75% on tool costs is described in a folder from National Machine Tool Co. The Heinrich "Grip Master" is instantly adjustable; has positive lock that hammer blows cannot break.
Inform-A-Gram No. B32.

Hardness Testing for all kinds of applications can be done with one of The Shore Instrument & Mfg. Company's Scleroscope models. Illustrated literature covering these instruments has been printed.
Inform-A-Gram No. B33.

"Precision Grinding by Reid" is a three-color folder featuring Reid Model 618 Precision Surface Grinder. Variable table speeds of 12 to 35 fpm are a highlight of this machine. REID BROS. CO., INC., Dept. TDJ, Beverly, Mass.
Inform-A-Gram No. B34.

Special Cutters of high speed steel and carbide for a wide variety of applications are made by National Tool Salvage Co., whose complete catalog is available upon request.
Inform-A-Gram No. B35.

DIE CUSHIONS THAT MODERNIZE YOUR DIE CONSTRUCTION AND DESIGN

ADAPTABLE TO ALL DEEP DRAWING PRESS OPERATIONS.

Self-contained unit, quickly installed on any punch press.

Furnished with hardened and ground pin pressure pad.

DIE CUSHION PISTON DIAMETER						
5"	6"	8"	10"	12"	14"	16"
MAXIMUM DRAW						
2"	2½"	3"	3"	3"	4"	5"
DRAW RING HOLDING PRESSURE (in tons)						
.9	1.4	2.5	3.9	5.7	7.7	10.0
SHIPPING WEIGHT (approx. lbs.)						
66	138	150	200	310	450	650

Write for Catalog No. 100-1

DAYTON ROGERS
Manufacturing Company
MINNEAPOLIS 7, MINNESOTA

Detailed Operational Information about the new radio-frequency gear-hardening machine, the Inductall, is presented in a new Westinghouse booklet, B-5259. The Inductall's adaptability in handling spindle gears, spur gears, cluster gears and shafts for either through or contour harding is explained with the help of diagrams and photographs. WESTINGHOUSE ELECTRIC CORP., Box 2099, Pittsburgh 30, Pa.
Inform-A-Gram No. B36.

The New Barnes Band Saw Folder features the "Skip Tooth" for high speed cutting of soft, nonferrous metals, plastics, fibres, etc. The teeth of the "Skip Tooth" are of special design and proportion in relation to the pitch or teeth per inch. The result is greater gullet capacity, permitting fast cutting through heavy sections of non-ferrous metals with excellent chip clearance.
Inform-A-Gram No. B37.

The Hazen Knock-Down Materials Handling Box, with its patented nesting features and built-in safety, combines the stacking and strength features of rigid boxes with the consolidation features of other collapsible boxes. An illustrated, six-page bulletin tells the whole story. JERVIS B. WEBB CO., 8933 Alpine Ave., Detroit 4, Mich.
Inform-A-Gram No. B38.

Precision Workers Do the Job Faster and more accurately with a Magni-Focuser, the proved binocular magnifier. Gage reading, layout work, inspection, tool and die work are a few of the jobs on which the Magni-Focuser can be used. A descriptive folder published by the manufacturer Edroy Products Co.
Inform-A-Gram No. B39.

Four Ways to Increase Industrial Production are detailed in an informative booklet published by The Work-Factor Co., management consultants. The methods are: aggressive control of indirect expenses; positive inventory control; full utilization of direct labor; and the most efficient use of production equipment and plant layout. For this booklet of actual case histories, write THE WORK-FACTOR CO., 366 Madison Ave., New York 17, N. Y.
Inform-A-Gram No. B40.

Balas Collet Catalog. A detailed catalog of collets, pushers, pads and other machine tool accessories has been compiled by Balas Collet Mfg. It pictures, describes and lists prices for the compline Balas line, and gives suggestions for use and application to various machine tools.
Inform-A-Gram No. B41.

Fluid Power Equipment Bulletin. Eight-page Bulletin 10051-A, from The Oilgear Co., illustrates and describes a complete line of fluid power pumps, motors, transmissions, cylinders and valves. THE OILGEAR CO., 1560 W. Pierce St., Milwaukee 4, Wis.
Inform-A-Gram No. B42.

Haskins Flexible Shaft Machines are presented in current illustrated literature. These machines have been designed and engineered to cut costs on all grinding, sanding, filing, buffing, polishing and similar operations.
Inform-A-Gram No. B43.

Schaffer Load Centering Eye Bolts have a perfect self load centering action that provides true alignment of load, eliminates bolt thread straining and breaking off. Descriptive literature may be had.
Inform-A-Gram No. B44.

3-E Lubricant, now being marketed by Wayne Chemical Products Co., substitutes for white lead on lubricating jobs. It is nonpoisonous, and lighter in weight and less expensive than the commonly-used white lead. Detailed information is procurable.
Inform-A-Gram No. B45.

The Transparent Shim Stock Punch has been engineered by Allied Tool & Die Co. for easy and precise location of center lines. Descriptive literature is being distributed.
Inform-A-Gram No. B46.

Dy-Chek Dye Remover is the subject of Bulletin 505, the latest in the Dy-Chek Company's periodical Inspection Clinic series. Write to DY-CHEK CO., Div. of Northrop Aircraft, Inc., 1543 E. Broadway, Hawthorne, Calif.
Inform-A-Gram No. B47.

Faster, Cooler Cutting Action makes Aloxite AA-V10 aluminum oxide grinding wheels ideal for a wide variety of toolroom applications. New Carborundum literature provides full information.
Inform-A-Gram No. B48.

PRODUCTION goes up ——— SPOILAGE ——— goes down

Exclusive! Procunier "Tap Saver"

—with this Procunier High Speed Tap Head

Today you must speed up your production schedules . . . yet reduce spoilage! The Procunier High Speed Tapping Head is precision-built for faster, consistently accurate production tapping. Exclusive Procunier features enable you to maintain cleaner, sharper threads . . . with fewer broken taps, fewer spoiled pieces.

HERE'S WHY: Tap driving pressure is *automatically regulated* by the amount of pressure applied to the unique Procunier friction clutch. Operators quickly learn to detect dull or "loaded" taps just by the pressure needed to drive them! This increased sensitivity enables even "green" operators to do more accurate tapping. "Blind" hole tapping may be done as easily as through tapping! *Prompt Delivery.* WRITE TODAY for brochure giving full details on Procunier High Speed Tap heads. NEW! Procunier "Tap King" for large hole tapping. Capacity ⅜" to 1" in steel; 1⅛" in softer metals.

The exclusive Procunier "Tru-Grip" tap holder is lighter, smaller in diameter. It affords easier tapping close to walls or shoulders, eliminates "chewed" tap shanks. Holds tap true.

Procunier Safety Chuck Co.,
12-14 S. Clinton, Chicago 6, Dept. 4

Send illustrated brochure giving complete details on the improved line of Procunier High Speed Tapping Heads.

Name .....

Address .....

SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS

Highest Accuracy with 6½" Range and better capacity to measure large and heavy work are features of the Shop Measuring Microscope made by Boeckler Instrument Co. A brochure is offered.
Inform-A-Gram No. B49.

Nicholson Rotary Files and Burs are the subject of instructive Catalog No. 3. It lists all types, shapes, sizes and cuts; gives useful shop information on proper speeds, use and care of carbide burs.
Inform-A-Gram No. B50.

Substantial Increases in Hob Life and Production can be obtained with D. A Stuart Oil Company's "Thredkut" cutting fluid. Details can be found in the manufacturer's current literature offering.
Inform-A-Gram No. B51.

Micro Supreme Layout and Identification Dye, for quick identification of bar stock, sheets, strips or parts, is made by Michigan Chrome & Chemical Co. Samples and descriptive literature are procurable.
Inform-A-Gram No. B52.

A Cost-Cutting Vertical Rotary Attachment, the "DU-ONA-LATHE," is pictured and described in a new brochure. One quick adjustment and your lathe becomes a precision machine tool for jig boring, drilling, reaming, circular milling, graduating, cam work, etc. Complete features of this low-cost attachment are listed in the brochure. ALLAN MFG. CO., 22-76 Steinway St., Long Island City 5, N. Y.
Inform-A-Gram No. B53.

Flexible Shaft Machines. New Catalog 180-1 shows the complete Foredom line of machines for every "small-work" job of grinding, finishing, deburring, etc. Included in this eight-page publication are descriptions, illustrations and prices of heavy-duty, intermediate and light-duty models. FOREDOM ELECTRIC CO., 27 Park Place, New York 7, N. Y.
Inform-A-Gram No. B54.

Falk Piloted Type Couplings are presented in fully illustrated Bulletin 4115. These couplings carry the weight of extended shafts with no intermediate bearing support. The bulletin contains construction features, dimensions and typical applications. THE FALK CORP., 3001 W. Canal St., Milwaukee 8, Wis.
Inform-A-Gram No. B55.

A Better Drill for Hardened Steel is the new Super-Hard Carbide Drill of Super Tool Co. The long carbide end keeps cutting heat away from braze. All pertinent information on this drill is contained in Catalog Supplement No. 4.
Inform-A-Gram No. B56.

Tool and Cutter Grinders, fixtures and attachments are pictured and described in K. O. Lee's current, 24-page catalog.
Inform-A-Gram No. B57.

HOLES for sale
ANY NUMBER • ANY PATTERN
PROMPT DELIVERIES
Zagar GEARLESS Drillhead, 12", 24-spindle drillhead; capacity to 5/8" in steel.
• For sale: low-priced holes, yet perfect and highly profitable! Drill many hundreds of holes at one pass—any number of spindles—any material (steel, glass, plastics, acoustical tile, etc.) —any pattern—as close as twice drill diameter. Adaptable to any standard drill press or designed as complete unit. A new high in production, a new low in cost. Send us your part drawing now for quick quotation.
Ask for Catalog T-4.
ZAGAR TOOL, INC., 24000 Lakeland Blvd., Cleveland 23, O.
Zagar
TOOLS FOR INDUSTRY and SPECIAL MACHINERY

The "Lign-o-Matic" Self-Centering Drill Turret fits any standard drill press and handles any drilling operation up to ½" diameter in any material. It can be used in other consecutive drill press operations such as reaming and counterboring. Full details of price and advantages are listed in Bulletin No. 5010, available from the manufacturer, HOWE & FANT, INC., 521 Flaxhill Rd., South Norwalk, Conn.
Inform-A-Gram No. B58.

The Sanford Model MG Micro Grinder is a rugged, bench-type surface grinder that handles the critical little grinding jobs with ease, but has the extra capacity to take much work that would usually be assigned to larger machines. A four-page descriptive folder on the MG is obtainable from SANFORD MFG. CO., 1020-28 Commerce Ave., Union, N. J.
Inform-A-Gram No. B59.

"Each Drop Saves a Dollar" is the theme of a current folder describing Micronoil Gage-Lube, a lubricant that has been developed expressly to prolong the usefulness of precision instruments, tools and gages. PROTECTIVE COATINGS, INC., P. O. Box 57, Strathmoor Station, Detroit 27, Mich.
Inform-A-Gram No. B60.

All-State Alloys And Fluxes for welding, brazing, soldering, cutting and tinning are featured in a new folder of purchasing data. All details that a buyer or purchasing agent must know to make proper selection and to enter his order are covered. ALL-STATE WELDING ALLOYS CO., INC., 273 Ferris Ave., White Plains, N. Y.
Inform-A-Gram No. B61.

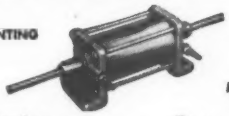
Informative Engineering Data on precision castings produced by the Mercast process are contained in a current, eight-page bulletin. A pictorial story shows the step-by-step production of stainless steel aircraft parts by precision castings. ALLOY PRECISION CASTINGS CO., E. 45th & Hamilton Ave., Cleveland 14, Ohio.
Inform-A-Gram No. B62.

Vlier Tool Specialties, including spring plungers, torque thumb screws, fixture keys and spring stops, are pictured and described in an eight-page brochure. Information is given on dimensions, applications, construction features, etc. VLIER MFG. CO., 4552 Beverly Blvd., Los Angeles 4, Calif.
Inform-A-Gram No. B63.

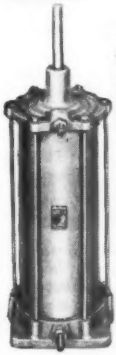
The Helios Vernier Caliper is a precision instrument for inside, outside and depth measurements. It has 6" (English) and 150 mm. (Metric) scales on the one tool. The American distributor, Karl A. Neise, will send descriptive literature.
Inform-A-Gram No. B64.

DOUBLE-ACTION

AIR CYLINDERS



VERTICAL MOUNTING

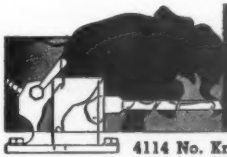


SUSPENDED OR SWIVEL MOUNTING

Mounting	Bore				
Horizontal	1½"	2¼"	3"	4"	5"
Vertical	1½"	2¼"	3"	4"	5"
Face	1½"	2¼"	3"	4"	5"
Swivel	1½"	2¼"	3"	4"	5"

Length of stroke optional

The new Mead Air Power Catalog shows the full line of single and double-acting cylinders, and air-operated Presses, Vises, Chucks, Hammers, Work Feeders—for faster, money-saving production. Write today!



MEAD SPECIALTIES COMPANY

4114 No. Knox Ave., Dept. HA-41, Chicago 41, Ill.

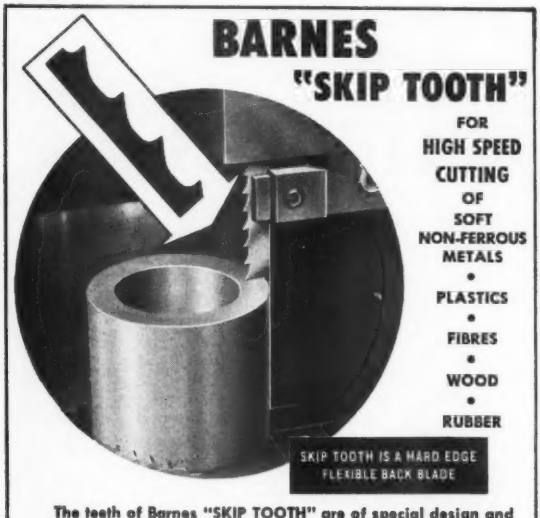
SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS

750,000 Drill Bushings in Stock are your assurance of prompt service from Ace Drill Bushing Co. The manufacturer offers descriptive literature on these durable bushings, which are precision made and light-wave tested for .0003" maximum tolerance.
Inform-A-Gram No. B65.

Heat-Treat Furnaces. Eight convenient sizes of electric bench-type units are pictured and described in a Data File obtainable from Thermo Electric Mfg. Company.
Inform-A-Gram No. B66.

Production's No. 100 Polishing Machine is a high speed model featuring centerless feed. An illustrated bulletin, No. 5, gives complete details, including specifications and design highlights. PRODUCTION MACHINE CO., Dept. TDJ, Greenfield, Mass.
Inform-A-Gram No. B67.

Three Pieces or 10,000, Federal "Controlled Tolerance," short run stampings guarantee quality. An illustrated, descriptive bulletin has been issued.
Inform-A-Gram No. B68.



The teeth of Barnes "SKIP TOOTH" are of special design and proportion in relation to the pitch or teeth per inch. The result is greater gullet capacity permitting fast cutting through heavy sections of non-ferrous metals with excellent chip clearance. Skip Tooth is recommended for plastics, rubber, wood, cork, etc. The hardened, widely spaced teeth cut freely and remain cooler at high speeds.

Ask Your Barnes Distributor for the new Barnes Band Saw folder

BARNES
ESTABLISHED 1919
W. O. BARNES CO., INC.
1297 TERMINAL AVE. • DETROIT 14, MICH.

Essa Shaving Presses are among the outstanding Swiss punch presses presented in a 12-page catalog available from Cosa Corp. On the shaving press, the crankshaft operates a cam that transmits this motion to the ram at the rate of 600 to 800 vibrations per minute. The thickness of the part determines the number of vibrations. These rapid vibrations allow the ram to descend only .002" per inch for each vibration. Therefore, this small travels gives a high polish and perfect accuracy to the part. COSA CORP., 405 Lexington Ave., New York 17, N. Y.
Inform-A-Gram No. B69.

The "Acro-Bore" Boring Unit, designed to replace the old style hand feed, is the subject of a new catalog sheet issued by the manufacturer, Skyline Tool & Gage Co. A complete description of the unit is given, along with mounting instructions and price information. SKYLINE TOOL & GAGE CO., 4126 Newark Ave., Cleveland 9, Ohio.
Inform-A-Gram No. B70.

"Protect-O-Metal" weld spatter preventives and metal protection compounds are described in new Bulletin No. 50 of G. W. Smith & Sons, Inc. This bulletin discusses composition, application and potential savings provided by three grades of "Protect-O-Metal." Address G. W. SMITH & SONS, INC., 5400 Kemp Rd., Dayton 3, Ohio.
Inform-A-Gram No. B71.

The Wales Sheet Metal Fabricator is high-lighted in fully-illustrated, functionally-colored Catalog 10-A. Features include rapid interchangeability for punching, notching and nibbling.
Inform-A-Gram No. B72.

The Improved "Stay-New" Hydraulic Filter is designed for use wherever dirty liquids are collected and re-circulated. It is suited for application on lathes, millers, shapers, planers, hydraulic presses and many other machine tools. The three ways in which this filter can effect savings are detailed in a new brochure that also contains, photographs and specifications. DOLLINGER CORP., 11 Centre Pk., Rochester 3, N. Y.
Inform-A-Gram No. B73.

Barnaby Tools for Screw Machines are covered in an attractively illustrated, four-page circular. Descriptions, photographs, sizes, dimensions and prices are given for rotary stock stops, chuck-type floating holders, conventional floating holders, non-releasing tap holders, and hinged-shoe bushing blanks. BARNABY MFG., CO. INC., 70 Knowlton St., Bridgeport 8, Conn.
Inform-A-Gram No. B74.

The Physical and Mechanical Characteristics of three non - hardening straight chromium stainless tubing steels are outlined in Bulletin TDC 140 of Babcock & Wilcox. Included are technical data on analyses, creep strength, corrosion and oxidation resistance, machining, etc. THE BABCOCK & WILCOX TUBE CO., Dept. TDJ, Beaver Falls, Pa.
Inform-A-Gram No. B75.

"Heavy - Duty Alkaline Cleaning of Ferrous Metals" describes in detail approved methods for alkaline soak tank cleaning, alkaline spray cleaning and other processes. Procedures to be followed are fully detailed. Special Chemicals Dept., PENNSYLVANIA SALT MFG. CO., Philadelphia 7, Pa.
Inform-A-Gram No. B76.

For Measuring Inside, Outside and Depth, George Scherr Co., Inc., offers the Mauser-Precision Vernier Caliper. A new, exclusive camlock and gib improvement instantly fixes setting, prevents shifting and guarantees squareness of jaws. An illustrated circular has been prepared.
Inform-A-Gram No. B77.

Cincinnati Shapers, featuring accurate feeding and accurate cutting, are the subject of comprehensive Shaper Catalog N-5.
Inform-A-Gram No. B78.

P & W Punches And Dies And Miscellaneous Tools are covered in a new 16 - page circular, No. 533. Sizes, prices and illustrations are included. PRATT & WHITNEY, Div. Niles-Bement-Pond Co., 15 Charter Oak Blvd., W. Hartford 1, Conn.
Inform-A-Gram No. B79.

Low - Cost Short Run Stampings, made with temporary or semi-permanent dies, are the specialty of WLS Stamping Co. of Cleveland. Full details are procurable.
Inform-A-Gram No. B80.

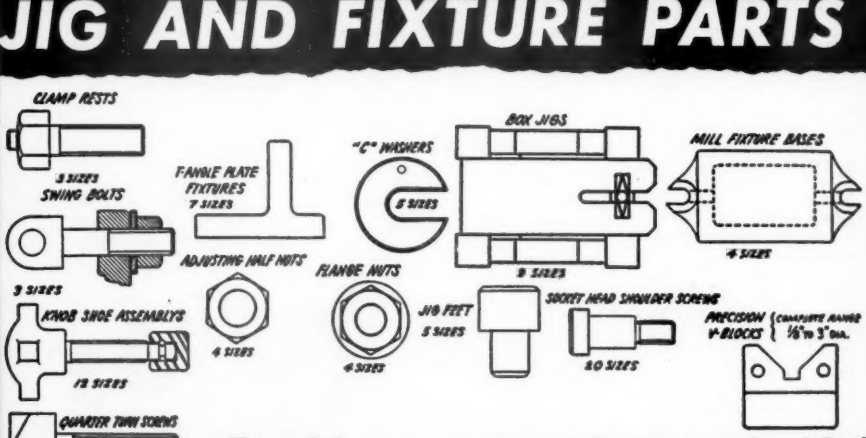
S&E
TUNGSTEN CARBIDE
ROTARY CUTTERS
PRECISION TOOLS FABRICATED TO EXACTING STANDARDS
• Heads are completely form ground concentric with shanks and are fully form cutting — no "dead spots."
• Ten standard shapes in 1/8", 1/4", 3/8" and 1/2" diameters. Special sizes and shapes to your specifications.
• Custom resharpening. Prompt service at nominal charge.
WRITE FOR NEW ILLUSTRATED BULLETIN NO. 103
S&E MACHINE PRODUCTS, INC.
Sales Offices in Principal Cities
Plant and General Office: Bridgeport, Mich.

SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS

SAVE MAN-HOURS

OF YOUR DESIGNERS AND TOOLMAKERS!

USE NOBLE & STANTON STANDARD JIG AND FIXTURE PARTS



The rush is on . . . manpower shortages are here! Don't waste the valuable time of your designers and toolmakers in custom-building jig and fixture components.

Now is the time to use Noble & Stanton *Standard* Jig and Fixture Parts. Adopt them as standards in your plant. They're the best you can buy—are tough and durable—will never fail on the job—can be used over and over again.

Noble & Stanton Components are precision made from quality steels. NS parts are turned from solid stock—not welded or brazed. They're heat treated and hard chrome plated wherever practicable.

Write today for full information on the Noble & Stanton line of over 300 parts. They cost less than one-third the cost of toolroom manufacture. Tracing sheets are available for every part—saving you design time. Try a few of the items—or stock the whole line!

***WRITE FOR CATALOG.** Send today for this free 52-page book of drawings, specifications and prices.*

NOBLE & STANTON, INC.

1002 BROADWAY • BEDFORD, OHIO

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INFORM-A-GRAM KEY NUMBERS

The Challenge Work Bench has a heavily ribbed, smoothly machined cast-iron top that provides a "surface plate." Complete details on sizes and other features are contained in current Challenge Machinery Co. literature.
Inform-A-Gram No. B81.

52100 Steel Tubing and Bars, made by Peterson Steels, Inc., gives you high hardness, yet is easily machined. A complete stock list published by the manufacturer contains full information on all available sizes, finishes, etc.
Inform-A-Gram No. B82.

14½" Swing South Bend Toolroom Precision Lathes provide the subject matter for Bulletin 5101. Information given includes specifications, prices and attachment descriptions. SOUTH BEND LATHE WORKS, South Bend 22, Ind.
Inform-A-Gram No. B83.

Catalin Tooling Resin can be used in every phase of sheet fabrication to cut tooling costs and save production time. Data sheets and samples are available on request to Catalin Corp of America.
Inform-A-Gram No. B84.

ready for *immediate* conversion . . .

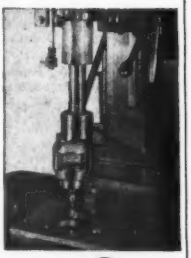
Onsrud

D 1-S HOLE GRINDER

Immediate low-cost conversion from jig borer into *precision jig grinder* is now possible through the use of the Onsrud D 1-S Hole Grinder. Here's the tool you can't afford to pass up . . . precision *made*, for precision *work*.

Mounts on jig borer, lathe, mill or radial drill. Grinding wheel turned by Onsrud 50,000 R.P.M. ¼ H.P. air turbine motor.

More and more shop owners are finding out that the Onsrud HOLE GRINDER is a money-*saver* in tool making and similar work.



Onsrud

AIR TURBINE GRINDERS

Onsrud B-1 Grinder 75,000 RPM . . . 1/6 HP for 1/4" wheels and smaller.

Onsrud E-1 Grinder 38,000 RPM . . . 1/2 HP for 1/2" to 1" wheels

Onsrud D-1 Grinder 50,000 RPM . . . 1/4 HP for 1/4" to 1/2" wheels

For cool, lightweight, vibration-free operation . . . for power, speed, economy, it's Onsrud AIR TURBINE GRINDERS every time—say operators who know grinding best! Air Turbine Motors also built for use on machines you build.

ONSRUD MACHINE WORKS, INC.
3900 PALMER STREET • CHICAGO 47, ILL.
Distributor and Agent Inquiries Invited

Tapered End Mills, Constant Spiral. (Die Sinking Cutters) are included in the extensive Weldon Tool line. Coming in a wide range of sizes that gives a choice of many lengths and diameters, these mills are all three-flute and offer a choice of ½°, 1°, 2°, 3°, 5° and 7° angles. Descriptive literature has been prepared.
Inform-A-Gram No. B85.

The Lectroetch Stencil Printer uses regular printer's type for emergency and short run marking. Stencils will mark finished precision metal parts quickly, without burrs, strain or deformation with the Lectroetch Stencil Etching Process. Descriptive literature is being mailed.
Inform-A-Gram No. B86.

Peaslee Engravers' Cutters are illustrated and described in Bulletin C-10. These close tolerance cutters are for use on high speed milling machines, duplicators and pantographs. Flats are ground from .0005" to .001" above center to cut your sharpening time and costs.
Inform-A-Gram No. B87.

The Levin Micro-Drill Press is designed to hold small drills in precision collets, thus overcoming the difficulty of getting a drill to run true as when held in a conventional drill chuck. An illustrated bulletin on the micro-drill press is procurable from Louis Levin & Son, Inc.
Inform-A-Gram No. B88.

Perkins Power Presses are pictured in a bulletin just out. This publication highlights the features and specifications of the No. 650 Model B Inclinable Press. Copies may be had from PERKINS MACHINE CO., Dept. TDJ, Warren, Mass.
Inform-A-Gram No. B89.

A New 20-Page Booklet on Die Cushions has been published by Danly Machine Specialties, Inc. It catalogs the complete Danly line of die cushions for mechanical presses, with detailed size, capacity and dimensional data. A valuable feature of the booklet is a series of cushion selection charts covering a wide range of sizes and types of die cushions. All are shown in photographic illustrations accompanied by engineering drawings. DANLY MACHINE SPECIALTIES, INC., 2100 S. Laramie Ave., Chicago 50, Ill.
Inform-A-Gram No. B90.

Abrasive Materials, grinders, sanders, circular saws, cutters, etc., are among the complete line described and illustrated in The Schupack Supply Company's comprehensive Catalog M-3. Featured is an assortment of 144 abrasive wheels and points, all mounted on the finest ⅛" steel mandrels. Current prices are listed in this colorful catalog. THE SCHUPACK SUPPLY CO., 7331 Cottage Grove Ave., Chicago 19, Ill.
Inform-A-Gram No. B91.

The Eriez Magnetic Hump is designed to remove tramp iron from materials conveyed in pneumatic, gravity flow or liquid lines. New Bulletin 702, describing this unit, includes construction and application data, information on the selection of the proper magnetic separator, and engineering diagrams. ERIEZ MFG. CO., Dept. TDJ, Erie, Pa.
Inform-A-Gram No. B92.

The Yost Drill Press Vise, designed expressly for use on drill press operations, is offered in two sizes. A current bulletin covers the extensive Yost Mfg. Co. line.
Inform-A-Gram No. B93.

New Possibilities in Grinding Tungsten Carbide are outlined in Bulletin T-4, which features the Visual-Grind of The Cleveland Grinding Machine Co. Techniques of image, profile and template grinding are combined in this one machine.
Inform-A-Gram No. B94.

Quick Delivery of quality, standardized fixture details is promised by Morton Machine Works. An extensive catalog of these products has been released.
Inform-A-Gram No. B95.

Socket Screw Products, cap and set screws, nuts, taper pins and studs are designed by The Chicago Screw Co. to give you a tighter, lower-cost fastening for any heavy-duty purpose. Literature may be had upon request.
Inform-A-Gram No. B96.

Littell Pres-Vac Safety Feeders feed blanks from a distance of 14", eliminating the need of putting fingers under the press ram. The current Littell catalog gives complete details.
Inform-A-Gram No. B97.

YESTERDAY'S PIONEER . . . TODAY'S LEADER

TAPERED
END MILLS CONSTANT SPIRAL

(Die Sinking Cutters)

● The extensive line of the well known Weldon End Mills includes Tapered End Mills, Constant Spiral. Also known as Die Sinking Cutters these end mills, filling a definite need, come in a wide range of sizes, giving a choice of many lengths and diameters. Weldon Tapered End Mills as standard stock items are all 3-flute, and offer a choice of ½°, 1°, 2°, 3°, 5° and 7° angles. They represent the same high quality for which all Weldon End Mills are famous.

Weldon distributors throughout U.S.A. and Canada carry complete stocks to serve you.

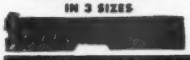
THE WELDON TOOL CO. Cleveland 4, Ohio
3000 WOODHILL ROAD

SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS

SAVE
TIME and MONEY
with
SUPEREAM

STOP-PINS
AVAILABLE IN 5 SIZES

FINGER STOPS
IN 3 SIZES



STOP-PINS are complete self contained units that hold securely in stripper plate. All sizes have 1/32" wall permitting insertion close to die or punch. No threads inside STOPS for springs to catch on. Write for literature and prices. SUPEREAM FINGER STOPS made in uniform width to fit any standard width slot. Just grind ends to fit. Write for literature.

TWENTIETH CENTURY MANUFACTURING CO.
3720 MONTROSE AVENUE CHICAGO 18, ILLINOIS

TOOL STEEL UNDER MARKET PRICES!

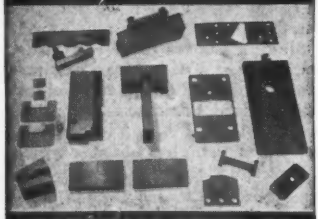
In our stock at present, ready for immediate shipment. Approx. 12-ft. lengths.

WEIGHT	SIZE ROD	MAKE	CARBON	MANGANESE	SILICON	VANADIUM	CHROMIUM
120,000 Lbs.	1-13/16"	Sanderson Extra	1.15-1.25	.25	.20		
45,000 Lbs.	1-13/16"	Houghton & Richardson Vanadium	1.05-1.15	.35	.20		
120,000 Lbs.	1-13/16"	Crescent Special	1.05-1.15	.25	.20	.18	.16
35,000 Lbs.	1- 5/8 "	Firth-Sterling Special	1.05-1.15	.25	.20		
20,000 Lbs.	2"	Crescent Extra	1.05-1.15	.25	.20		
35,000 Lbs.	1- 1/16"	Crescent Extra	1.05-1.15	.25	.20		

ALL OF THE ABOVE STEEL IS ANNEALED. 100% MACHINABILITY.
WRITE OR WIRE FOR PRICES ON ANY QUANTITY.

CREST MANUFACTURING COMPANY
3001 WELTON STREET
DENVER 5, COLO.

starting from scratch
WITH MARSHALL PRECISION GROUND FLAT STOCK



The world's largest range of sizes of precision ground tool steel in three grades are available, ready for immediate shipment and the layout bench.

★ WATERcrat: A fine grained electric furnace high carbon tool steel. It has been wet ground to remove all bad surfaces and to assure velvet finish of virgin metal.

★ OILcrat: An outstanding product of careful handling assures you of a fine grained electric furnace oil hardening ground flat stock ready for the layout bench.

★ AIRcrat: This air-hardening tool steel shows less size change and offers a greater safety in hardening than either of the other grades. Dept. TD.

Write for descriptive literature, catalog of sizes and prices.

MARSHALL STEEL CO.
LA GRANGE, ILLINOIS
The Aristocrats of Ground Tool Steel

Tungsten Carbide Rotary Cutters are included in Bulletin No. 103 of S & E Machine Products, Inc. These precision tools have heads that are completely form ground concentric with shanks and are fully form cutting. Ten standard shapes are available.
Inform-A-Gram No. B98.

"Unbrako" Socket Screws of all types are described in Standard Pressed Steel Company's new Bulletin 643-R. Standard sizes of all screws are ready for immediate delivery.
Inform-A-Gram No. B99.

The Full Line of Armstrong Tool Holders and other products, including C-clamps, machine dogs, wrenches, etc., is presented in a comprehensive catalog being mailed by Armstrong Bros. Tool Co.
Inform-A-Gram No. B100.

A Complete Catalog of Air Cylinders and air arbor presses is available from Air-Mite. Air cylinders are available in 1" 1½", 3", 4" and 5" diameters; stroke length optional.
Inform-A-Gram No. B101.

Rousselle Punch Presses, for high speed production with low annual maintenance, are described in new literature being distributed by the manufacturer of this line, Service Machine Co.
Inform-A-Gram No. B102.

"Micro-Mesh" Pure Diamond Lapping Compound, for precision finishes on carbide, tools, dies, etc., and mirror finishes in minutes, is featured in literature from A-1 Abrasive Laboratories.
Inform-A-Gram No. B103.

Rimat Dial Bore Gages, for precision measurement of "O" ring grooves, snap ring grooves, thread reliefs, etc., are described in current literature from the California firm.
Inform-A-Gram No. B104.

Johnson Metal Cut-Off Band Saws will quickly pay for themselves and give trouble-free service year after year. Descriptions of various models are contained in the manufacturer's latest literature offering.
Inform-A-Gram No. B105.

Nesting Type Tote Pans, made by J. L. Lucas & Son, Inc., are 20" long x 12" wide x 6¼" deep. These pans have drag holes and handles at both ends. Complete details, including prices, are obtainable.
Inform-A-Gram No. B106.

Erickson Speed Indexers are designed to speed up and simplify positioning and holding operations. They can be used in horizontal or vertical positions. Current Erickson literature gives prices and other data.
Inform-A-Gram No. B107

Cast Alloy Rotary Files, giving up to 20 times the life of high speed steel, are presented in a new catalog and price list released by Ferriot Bros., Inc. Over 300 sizes and shapes are available.
Inform-A-Gram No. B108.

SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS

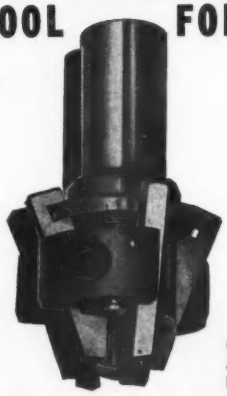
KUTMORE ADJUSTABLE HOLLOW MILLS

THE FINEST TOOL FOR PRODUCTION

CUTS PRODUCTION TIME

- TURNING
- TAPERING
- FACING
- CHAMFERING
- TREPANNING

Any combinations of above in ONE PASS



- Exclusive Micrometer Adjustment Feature for Rapid Set-Up.
- Cutting Capacities From 1/32" to 2" Diameter In Standard Stock.
- Blades Quickly Resharpened In Complete Sets.

Write for Catalog No. 20TD

Our Engineering Department Is At Your Disposal On Your Hollow Mill Problems.

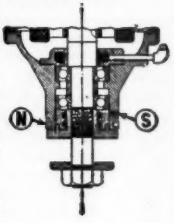
CARL WIRTH & SON, INC. 1625 CLINTON AVE. NO. ROCHESTER 5 N Y

TYPE PAV
PROMPT DELIVERY!

VERTICAL SPINDLE GRINDER

The Standard Verticle Spindle Grinder is made in sizes from ½ H.P. to 25 H.P. Speeds of 1200, 1800 or 3600 R.P.M. for cup or plate mounted cylinder type of wheel. Ideal for application to Planers, Boring Mills, Shapers, Milling Machines, etc. With or without feeds.

This sectional view illustrates a creation of Standard's engineers — evidence that you receive more when you buy a Standard tool. Sectional view of thrust bearing construction on all Standard modern Vertical Spindle and Double End Disc Grinders.



Threaded Nut "N" permits fractional thousandths adjustment by releasing Set Screw "S" to take up wear on bearings without removing wheel— no shims involved.

WRITE FOR CATALOG 44 TODAY

The Standard Electrical Tool Co.

Mt. Hope & Sixth St. Cincinnati 4, Ohio

Machine Design Conference on "Automation"

A partial answer to the critical manpower shortages which face industry was given recently at the eighth annual conference of the Machine Design Division of the Cleveland Engineering Society.

Automation, a new word coined by the Ford Motor Co., was the theme of the conference. This new word to the machine design field designates automatic feeding, unloading and handling of work to, from and between production machines.

Charles E. Krause president, Krause Design, Inc., Rochester, N. Y., had as his subject: "Automatic Feed and Transfer Devices." He discussed the use of automatic feed, transfer and similar devices which offer many unique possibilities to the machine design engineer. There are many basic types which can be used. Each has its own advantage but requires proper orientation.

Feed and transfer devices inter-connecting standard production units permit advantages of special equipment without the high cost of developing complex machinery.

Hopper feeding of parts to a machine requires the proper positioning of the parts for automatic assembly. A part that has un-like surfaces is an example of a problem which faces the designer. So that the parts are fed in the proper position, the pick-up must be such that only those parts properly positioned will feed to chute.

Parts having a length greater than the diameter will not cause as much difficulty in feeding down the chute as those having a length less than diameter.

Franklin G. Gepfert, president, Black Drill Company, Cleveland, presented as his subject, "The Power Package in Design," the power package in this instance being an in-line drilling unit.

This unit has a traversing motor whose shaft is also the work spindle. Because the spindle and motor rotor are integral, torque is applied evenly around the spin-

NOW!
A SURE WAY TO PRODUCE MIRROR FINISHES, FASTER!
ELGIN DYMO
diamond compound
Tested and proved by hundreds of industrial users on plastic molds, carbides, drawing dies, precision parts, and cutting parts.
DYMO finishing will reduce finishing and polishing time in your shop and give you mirror finishes every time. Write today for free demonstration—proof of DYMO FINISHING advantages.
INDUSTRIAL PRODUCTS DIVISION
ELGIN NATIONAL WATCH COMPANY
ELGIN, ILLINOIS

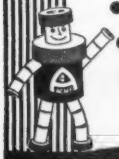
SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS

Acme Offers Complete Facilities for All Types of

PRECISION GRINDING

FAST SERVICE... EXPERT WORKMANSHIP... LOW COST

- INTERNAL
- EXTERNAL
- CRUSH FORM
- CENTERLESS
- TWIN DISC
- SURFACE
- THREAD



Acme is equipped to handle all types of precision grinding. Expert craftsmen, using newest methods and modern equipment, will do the job for you faster, better, more economically. Acme also offers a flat lapping service that can finish surfaces to within millionths. Write for details.

Acme Industrial Company

Makers of Standardized Jig & Fixture Bushings

206 N. LAFLIN ST. • CHICAGO 7, ILLINOIS

THE SERVICE SHOP TO INDUSTRY FOR MORE THAN 25 YEARS

IMPROVED PERFORMANCE WITH PERKINS Model No. 650 B

New Model 650 B press with tie rods shrunk in frame for extra rigidity. Higher die space with greater depth of throat and larger bed area. New design inclining mechanism can be safely and easily operated by one man.

WRITE FOR YOUR COMPLETE INFORMATION BULLETIN

PERKINS MACHINE COMPANY

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dle. Rapid shockless advance to the work is provided by air feed, and uniform drill feed including break-through is hydraulically controlled. Without cams or gears to change, all adjustments for length of stroke, rapid advance and feed rate are quickly made. Cycling can be made as fast as the operation requires. These design features qualify this unit for efficient production whether applied to single or multiple unit setups. A workpiece requiring a series of operations can be processed by setting up a drilling unit to operate each of the cutting tools.

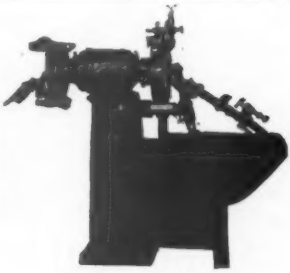
Mr. Gepfert illustrated a number of typical applications in which the drilling units are operated in horizontal, vertical and angular positions.

Frank J. Fink, president, F. J. Fink & Company, Cleveland, had as his subject, "Why a Special Machine and How." Mr. Fink analyzed the procedure followed by the machine designer in approaching a production problem. It must be determined whether a single-purpose machine is the best solution from the economic standpoint, relationships of labor costs and productivity.

He illustrated his talk with a film showing a rubber extruding machine operating in the plant of a wringer roll manufacturer. As the rolls emerge from the machine, they are cut in 20-foot lengths, and then picked up by a notched reel which unloads them on conveyors for transporting to other processing departments.

This machine is automatic in its operation and demonstrated the advantages of a single-purpose machine.

Russell G. Zuefle, product engineer, American Machine & Foundry Company, Buffalo, N. Y., chose as his subject, "Mechanical Hands to Replace Manual Operations." Mr. Zuefle described the development of a machine to replace the manual tying of the pretzel knot. In addition to extruding the noodle dough, cutting it to length and tying the knot, the conveying of the pretzels from the machine to the dipping, salting and baking operations became a definite automation problem. The dipping process puts a skin on the pretzel which becomes



Small drill holder on left adapts drills from No. 60 to 3/8 inch for dry grinding.

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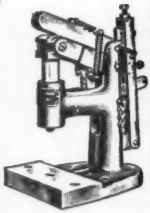

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the glaze after baking.

Many problems were encountered in developing this machine because the machine had to handle a wide variety of mixes, under extreme variations of relative humidity, and with the necessity for a variety of intermittent, reciprocating and precisely timed motions. Another problem which had to be met was that of designing the machine to operate where the atmosphere contained flour and salt. The lubrication system had to be carefully designed to prevent oil from contaminating the noodle dough, and then the adherence to all pure food laws had to be carefully observed.

Richard Denton, project engineer, Warner & Swasey Company, Cleveland, presented his subject, "High Speed Machines and Special Design Problems," as appled to weaving machines.

It was necessary for Mr. Denton to give a very comprehensive explanation of the difference between loom weaving and machine weaving, so that the design problems which had to be solved could be more easily understood.

In loom weaving, a series of parallel threads or yarn called the warp, is wound on a drum. One set of ends is attached to another drum. This arrangement keeps the warp tight and provides a means for rolling up the cloth as the weaving progresses. The warp threads are staggered so that as the shuttle is passed back and forth between them, one warp thread is on top of the filler thread and the next one below. Thus the filler thread is continuous in the woven cloth.

With machine weaving, the filler thread is cut off to length at the end of each shuttle pass with sufficient length so that it can be looped and tucked in at both edges; thus the filler threads are individual threads.

In designing this weaving machine, a number of factors had to be taken into consideration such as simplication of the mechanism, design of the machine components for mass production on automatic and special-purpose machines, use of stamped parts, use of precision castings for intricate small parts, utilization

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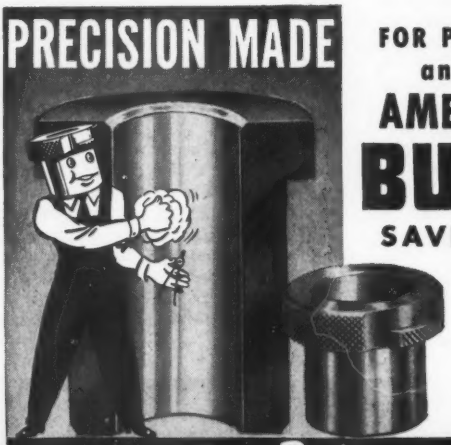

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of furnace brazing methods, use of unit type construction for machine elements and standardization of similar parts of different groups.

He described the use of pilot models for proving the design and the functions of the machine components. The pilot models made it possible to test theories in the reduction of moving parts, thereby decreasing vibrations and wear, which in turn makes high machine speeds possible.

C. A. Litzler, president, Industrial Ovens, Inc., Cleveland, presented the subject of "Continuous Automatic Processing Equipment" as applied to the handling of webs and monafilaments, wire coating and takeup equipment.

He discussed the basic principle that most industrial operations are of such a nature that they can be performed by a continuous process.

He outlined how an entirely integrated processing system can be designed from separate operations.

Applying these principles, he showed how the evolution and development of a complete range of web handling equipment was developed. This equipment comprised units of many different kinds for various functions, such as coaters, dipping machines, drive rolls, heating machines, oven units, and system drives. Examples of continuous finishing setups, lacquering of cable, nylon coating of wire and film manufacture were discussed.

W. R. Slattery, manufacturing engineering staff, Ford Motor Co., Detroit, used moving pictures to illustrate his subject, "Automation at Ford."

His talk covered the problems of designing and operating equipment to achieve planned production goals. He took specific problems and defined the functions to be performed, location of the problems, the engineering and design required in the solutions and then made an analysis of how the solutions related back to the process. Many operations have been made completely automatic from the standpoint of automation and studies will be made of all jobs in the Ford plant.

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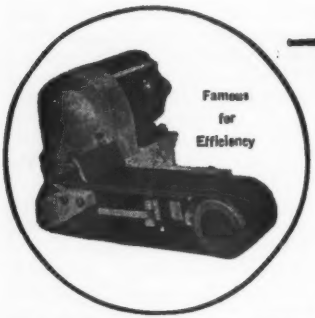

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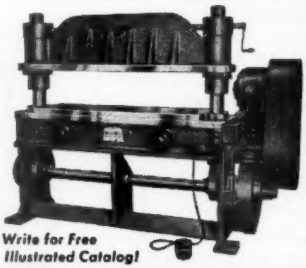

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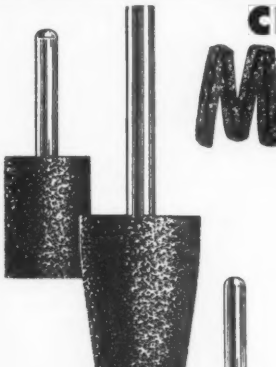

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. . . . **Rotators for Welding**

Fig. 3. Heavy glass lined tank on a pair of supports that permit the tank to be rotated by power, always keeping the tank in the most convenient position for rapid welding or other work.

Figure 2, this bearing takes a shaft clamped axially at one end of the tank and supports the load that might otherwise be on the wheels.

Where, as in Figure 2, a submerged arc weld is to be made circumferentially inside before the corresponding outside joint is welded, a belt carrying welding flux can be run under the joint, with the flux between the tank and the belt. This protects the weld from below and keeps molten metal from falling through. This arrangement has worked well even though flux must be fed to the belt as needed and the excess collected as it drops off the belt after passing under the weld area.

With a heavy glass lined tank like that in Figure 3, some means for turning it by power is a practical necessity and the same convenience is attained on lighter tanks, especially when they are of large size. If, as in this plant, automatic arc welding is done, the speed of rotation can be adjusted to suit the equipment, which remains fixed on a boom or bridge.

Rotators of the type described can be built easily to fit the needs of any shop fabricating large tanks and are likely to save their cost quickly in expediting fabrication.

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. . . Stainless Steel, from page 98

are such that there is little chance of the coolant diluting the lubricant that is used in the machine system. Where automatic equipment is employed, the use of soluble oils is questionable since any dilution of the lubricant within the equipment system may freeze the machine; this is particularly true where the equipment is rather old and the seals have worn. The soluble oils are usually emulsifiable compounds containing wetting agents, additive agents, rust inhibitors, and/or a germicide. There also is the advantage of good thermal conductivity and high specific heat.

The choice of the lubricant is an individual problem dependent upon individual conditions; where the compounded oils are used, usually the tougher stainless compositions require richer mixtures. In either case, of equal importance is both sufficient volume and proper direction of flow of lubricant so that maximum efficiency can be realized. Oil pressures must be sufficiently high so that chips may float away from the work. Also, cleanliness of lubricant cannot be overstressed which may mean that not only is the cutting fluid changed periodically, but also that the machines be also cleaned periodically so as to remove the most likely source of contamination. A motto to remember as stated by Carpenter Steel (5)—"the right lubricant and coolants, properly applied, assure you longer tool life—heavier cuts—higher speeds—better finishes—and fewer scrapped parts."

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SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS

New Developments in Reinforced Plastics

Many executives of a lusty new industry are concerned over current misconceptions that the importance of reinforced plastics, highlighted by military crisis, stems largely from its availability as a "substitute" material. Ideas on how best to refute this false notion were exchanged freely during the Sixth Annual Technical Session of the Reinforced Plastics Division of The Society of The Plastics Industry, Inc.

Actually, many of the materials which go into reinforced plastics are themselves in currently short supply, although manufacturers of resins and such principal reinforcing materials as fibrous glass are expanding production facilities as rapidly as possible to overtake record demand.

"Reinforced plastics has become an important engineering material by doing jobs no other material can perform; by doing a better job than another material at the same cost, or by doing as good a job as some other material more economically," according to Leonard S. Meyer, Chairman of the Reinforced Plastics Division of the SPI and Manager of the Plastics Division of Western Products, Inc., Newark, Ohio. "In its many applications," Mr. Meyer said, "reinforced plastics has superseded, rather than substituted for, metal, wood and other materials."

Born during World War II and applied successfully in many postwar civilian products, reinforced plastics is once again assuming military importance. However, it was noted, now as in the past, the uses for reinforced plastics are determined by its unique combination of properties, which no other engineering material offers—and not by its relative availability.

Because the components of this new material are not adequate to meet present demands, suppliers of the raw materials are discouraging new non-critical plastics applications. Thus, the manufacturer of a non-essential product, finding himself unable to obtain enough metal for production, is likely to be rebuffed when he tries switching to reinforced plastics.

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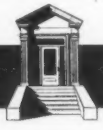

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The current "substitute" misconception is also a source of worry to many manufacturers now using reinforced plastics in their products, notably to those who had redesigned around a changeover before the Korean outbreak solely because reinforced plastics was the best material for the job.

The military crisis has actually inhibited a number of civilian developments for reinforced plastics because military programs have preempted a large share of the material supply. Present military applications of reinforced plastics, on an experimental or actual use basis, include: radomes, aircraft ducting, crash helmets, ammunition boxes, carrying cases, tote boxes, small boats, life floats, plotting boards, bleach containers, shipboard pipe, battery cases, portable shelters, aircraft landing mats, etc.

First significant use of the material was for radomes during the early years of World War II. As a protective shield against the elements for delicate radar and electronic equipment, fibrous glass-reinforced plastics was found to be ideal because it was nonmagnetic and nonconductive, strong, light-weight and impervious to weathering — a combination of properties offered in required degrees by no other material.

Reinforced plastics has been used in body armor strong enough to repel a .45 caliber projectile; in fishing rods that can't take a set and have properly varying degrees of flex and rigidity precisely engineered from handle to tip; in small boats and cabin cruisers that never need painting, are practically impervious to weathering; in washing machine agitators, housings and other parts nearly impossible or economically impractical to produce from metal; in electrical equipment laminates that are far tougher, more heat-resistant, smaller and lighter than competitive materials; in housings for various consumer and industrial products that are tougher, lighter and generally better than parts made from conventional material, yet cost less to produce.

As in past and present applications, the future of reinforced plastics will be

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Photos courtesy Ross Operating Valve Co Detroit, Mich.

The fixture holds *Ross* 4-Way air operating valves during a "run-in" operation. The clamp plungers are tipped with rubber grommets which seal exhaust and intake ports during the "run-in," after which the valves are torn down and inspected carefully. Besides the actual saving in man-hours, these "De-Sta-Co" Toggle Clamps convert a tedious setup job into one quickly and accurately performed by less highly-skilled labor.

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SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS

built on uses in which it does a better and more economical job.

At the same meeting, the announcement of the perfection of a glass fiber polyester laminate and fiberglas reinforced sheet having high resistance to moisture, assured the Air Force of a plastic virtually equivalent to light-weight steel in strength and serviceability.

Credit for the basic research and development was given to the Materials Laboratory, Engineering Division of the Air Material Command, U. S. Air Force Wright Field, Dayton, Ohio, in a paper read by L. L. Yeager of Bjorksten Research Laboratories. Cooperating in the development were: Bjorksten Laboratories, Pittsburgh Plate Glass Co., Monsanto Chemical Co., Glass Fibers, Inc., Owens-Corning Fiberglas Corp., Libbey-Owens-Ford Glass Co., and American Cyanamid Co.

As outlined by Mr. Yaeger, the new glass fiber reinforced polyester plastic was primarily developed in cooperation with the Air Force for structural parts of military planes. Laminates, moldings and reinforced sheets made of glass fiber and plastics have been used since World War II because of their high strength, low weight and ease of fabrication, Mr. Yaeger indicated.

"But the utility of these laminates and sheets in the past has been greatly limited by the fact that their mechanical strength properties can be radically impaired on exposure to water and high humidities," Mr. Yaeger said. They would lose about 50 per cent of their flexural strength on immersion in water or exposure to high humidities for any lengthy period. This limited their use to indoor and covered areas. Responsible for this weakness was the fact that chemists were unable "to marry" the glass fibers to the plastic. In the same sense that chewing gum does not really adhere well to a window pane, the "marriage" between the glass fibers and the plastics could always be weakened when sufficient water was introduced.

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After prolonged research, it was found that this trouble can be eliminated by the use of an "ambidextrous" molecule, i.e., a molecule which holds the glass fiber with one hand and clutches the plastic with the other hand. By coating the glass fibers with a compound (vinyl chloro silane) and then treating with water, the glass fibers were "married" to the silicon part of the compound, while the plastic could then be "locked" to the vinyl part of the compound. When this was done, the Air Force researchers at Wright Field found that the action of water was virtually without effect in reducing the bond between the plastic and the glass fibers. Repeated tests by immersion in water for 30 days, or by boiling for hours, established the point.

Civilian manufacturers, since World War II, have been interested in these glass-fiber reinforced plastics, Mr. Yaeger disclosed, because of the possibility of using them in place of thin steel where the full strength of steel is not absolutely essential. In these uses, Mr. Yaeger indicated, the glass fiber reinforced plastic is virtually equivalent to sheet steel in serviceability and on a weight and area basis it has greater structural strength than steel. Weight saving, he also pointed out, meant considerable savings on labor and transportation costs. Weakness of these plastics in the prolonged presence of water was a handicap, but now overcome with this new treatment.

As suggested by Mr. Yaeger, not only can the new glass fiber reinforced polyester plastic be used where light-weight steel is needed, but also for boats, fishing rods, office filing equipment, cases for typewriters, outdoor advertising signs, metal specialties, caskets, household appliances, and building materials.

Says Mr. Yaeger's report: "There are no critical materials involved in this vinyl chloro silane treatment, which has been carried out repeatedly at the laboratory of the Air Force at Wright Field, U. S. Dept. of Agriculture Forest Products Laboratory at Madison, Wis., and at the Bjorksten Laboratories."

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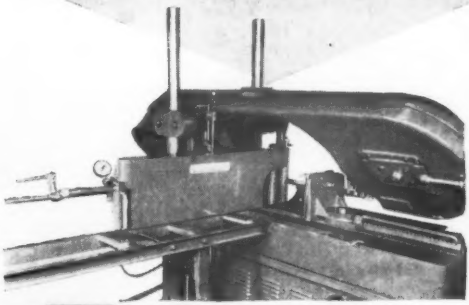

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SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS

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Threading Time Calculator. A simplified slide rule to estimate threading time on the Cri-Dan Single Point Semi-Automatic High Speed Threading Machine is now available from Lees-Bradner Co. The calculator is of practical value in estimating times within the Cri-Dan's broad range of capabilities, which

includes internal or external work, right-or left-hand, straight or tapered threads of any profile, etc. Send your request for this calculator to LEES-BRADNER CO., 12100 Elmwood Ave., Cleveland 11, Ohio.
Circle Inform-A-Gram No. C1.

A Table on Tolerances for round seamless carbon and alloy steel mechanical tubing is offered by Babcock & Wilcox. Giving permissible variations in diameter and wall thickness, it refers to cold-drawn-unannealed and finished-annealed tubing in sizes to 8⅞" OD, and to hot-finished tubing in sizes to 9⅝" OD. Write for Data Card 115C to THE BABCOCK & WILCOX TUBE CO., Beaver Falls, Pa.
Circle Inform-A-Gram No. C2.

Portable Electric Drills. Valuable tips on the care and use of these tools can be found in a new 36-page, Mall Tool booklet, "More Holes in a Hurry." Special emphasis has been placed on the industrial applications of portable electric drills, with several sections devoted to a step-by-step, technical explanation of drilling operations. A number of handy tables and charts give instant reference to various drill sizes and speeds required. MALL TOOL CO., 7705-B S. Chicago Ave., Chicago 19, Ill.
Inform-A-Gram No. C3.

More Than Just a Calculator, the precision instrument pictured below computes, "at a glance," the weight and length of strip metals in coils or straight lengths. Although designed for cold rolled strip steel, a factor table is included that enables the user to find his

answer for aluminum, brass, zinc and many other metals. PRECISION STEEL WAREHOUSE, INC., 4401 W. Kinzie St., Chicago 24, Ill.
Circle Inform-A-Gram No. C4.

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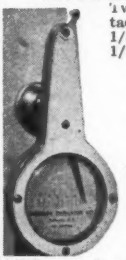

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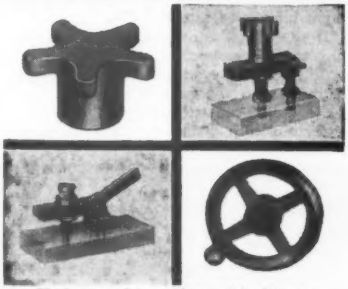

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SEE ADVERTISERS INDEX, PAGE 119, FOR KEY NUMBERS

A "Slide Rule" Chart presenting data and information on workability of stainless steels has been prepared by The Carpenter Steel Co. The chart includes a standard analysis table of stainless steels, together with their corresponding AISI type numbers, and gives relative fabricating data on the steels for a variety of operations. The slide gives specifications for forging, annealing, hardening and drawing Carpenter stainless steels, plus information on corrosion resistance, etc. THE CARPENTER STEEL CO., 306 W. Bern St., Reading, Pa.

Circle Inform-A-Gram No. C5.

"Die Casting," a new book by H. H. Doehler, chairman of the board of Doehler-Jarvis Corp., world's largest producer and finisher of die castings, is a thorough analysis and survey of the entire die casting process. It presents a clear picture of the virtually unlimited possibilities of die casting as a fabricating technique. Production, engineering, design and materials of die casting are discussed, and probable trends and developments in the near future are pointed out. Price is $8.00. Write the publisher, McGRAW-HILL BOOK CO., INC., 327 W. 41st St., New York 18, N. Y.

"Hydraulic Fundamentals and Industrial Hydraulic Oils" is a current, 44-page, Sun Oil bulletin containing information on hydraulic systems, maintenance, trouble-shooting, and selection of proper fluids. This publication, Technical Bulletin B-4, features specially prepared phantom and cutaway drawings illustrating functions of valves, pumps, hydraulic motors, torque converters, etc. Write on company letterhead to SUN OIL CO., Industrial Products Dept., Philadelphia 3, Pa.

Circle Inform-A-Gram No. C6.

Norton's Toolroom Grinding Handbook has been prepared to guide the toolroom operator or the apprentice in the proper selection and use of grinding wheels and to familiarize him with the principles and methods of grinding various types of tools and cutters. Besides covering such subjects as "Wheels for Toolroom Grinding," "Sharpening Milling Cutters and Reamers," and "Sharpening Lathe and Planer Tools," this 162-page book summarizes general wheel recommendations. NORTON CO., 1 New Bond St., Worcester 6, Mass., will honor requests.

Inform-A-Gram No. C7.

Cold Drawn Steels and Drill Rods are covered in the informative Catalog No. 5 of Pittsburgh Tool Steel Wire Co. This 48-page, pocket-size booklet includes recommendations for the heat treatment of tool steels and other useful data, in addition to complete catalog descriptions and illustrations of the company's products. Address all requests to PITTSBURGH TOOL STEEL WIRE CO., Dept. TDJ, Monaca, Pa.

Inform-A-Gram No. C8.

A Handy Speed and Feed Selector for machining stainless cold drawn bars may be had from Republic Steel Corp. Recommended feeds and spindle speeds are listed for eight of the most frequently machined analyses of ENDURO. Data are listed for a variety of tools. Ask for ENDURO Cutting Speed and Feed Selector, ADV. 466A. REPUBLIC STEEL CORP., Advertising Div., 3100 E. 45th St., Cleveland 27, Ohio.

Circle Inform-A-Gram No. C9.

Permite Aluminum Alloy Castings. The production and application of these castings are fully described in an attractive, 80-page booklet. Informative discussions of which aluminum alloy is best, advantages of aluminum, etc., are included. ALUMINUM INDUSTRIES, INC., Cincinnati 25, Ohio.

Circle Inform-A-Gram No. C10.

Motion Picture Films to teach gaging fundamentals and modern practice are available from Federal Products Corp. to industrial and Army and Navy training schools, colleges, vocational schools, and to industrial associations or societies. Two full-color films with sound (16 mm) are offered: "The Dial Indicator" and "Dial Indicator Gages." They are combined on one large reel. FEDERAL PRODUCTS CORP., 1144 Eddy St., Providence 1, R. I., will provide complete information.

Inform-A-Gram No. C11.

"Production Control in Manufacturing Industries" gives quick and accurate answers to production and inventory control questions. This 40-page, Remington Rand booklet, TM-596, highlights efficient and accurate record-keeping management to assure continuous and uninterrupted production flow. Punched card methods are shown for every phase of production control. REMINGTON RAND INC., Management Controls Div., 315 Fourth Ave., New York 10, N. Y., will promptly fill requests.

Inform-A-Gram No. C12.

"Gears and Their Lubrication" is a fully illustrated, Socony-Vacuum Oil handbook that discusses evolution of gears, fundamentals, need for lubrication, lubrication of both enclosed and open gears, Gargoyle Lubricants for gears, and benefits of correct lubrication. Copies of this 58-page book may be obtained by addressing SOCONY-VACUUM OIL CO., INC., 26 Broadway, New York 4, N. Y.

Circle Inform-A-Gram No. C13.

A 50-Page Book on Industrial Dust Control is offered by Pangborn Corp. Liberally illustrated with 15 photographs and 10 line drawings, the book treats, in three major sections, exhaust hoods and piping systems, dust collecting equipment, and exhausters and drives. PANGBORN CORP., Dept. TDJ, Hagerstown, Md.

Circle Inform-A-Gram No. C14.

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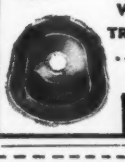

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The Method by Which Rivnuts Are Installed is shown in a new "pull-tab" demonstrator published by The B. F. Goodrich Co. Rivnuts are one-piece blind rivets with inside threads. Originally applied to airplane construction, they recently have had wide usage in varied fields. The "pull-tab" cites advantages of Rivnuts for many purposes and explains how they work. THE B. F. GOODRICH CO., Dept. TDJ, Akron, Ohio.
Circle Inform-A-Gram No. C15.

"Stainless Fabricating Tips" is a handy manual for sheet metal shops, covering forming, cutting, drilling and tapping, welding, riveting, brazing, soldering, etc. There are 20 illustrated pages of valuable data. Copies of this instructive manual may be had from ARMCO STEEL CORP., Dept. TDJ, Middletown, Ohio.
Circle Inform-A-Gram No. C16.

Steel Castings Booklet. Steel Founders' Society of America has made available additional copies of its comprehensive, 34-page, illustrated booklet on the steel casting industry. It uses graphic case history examples to demonstrate the advantages of steel castings. Special emphasis is put on economies of production, together with adaptability to complex design requirements. Write to F. Kermit Donaldson, executive vice president, STEEL FOUNDERS' SOCIETY OF AMERICA, 920 Midland Bldg., Cleveland 15, Ohio.
Inform-A-Gram No. C17.

Eye-Hazardous Occupations and the recommended eye protection for specific industrial eye hazards are listed in a new, revised issue of the "AO Eye Safety Guide." Completely illustrated, the guide contains a careful summary of recommendations made by the Safety Engineering Service Bureau of American Optical Co. for eye-hazardous jobs throughout many industries. AMERICAN OPTICAL CO., Dept. TDJ, Southbridge, Mass.
Inform-A-Gram No. C18.

Centrifugal Steel Casting Data are incorporated in an eight-page leaflet released by Lebanon Steel Foundry. Reference tables list a large number of alloy compositions and are supplemented by drawings, charts and product photographs, with sections on process, design factors, etc. Address William H. Worrilow, Jr., assistant general sales manager, LEBANON STEEL FOUNDRY, Dept. TDJ, Lebanon, Pa.
Circle Inform-A-Gram No. C19.

A New 12-Page Booklet on UCON Hydrolubes presents in detail their physical properties and advantages, as well as how to use these fire-resistant hydraulic fluids. Copies may be procured by writing to Carbide and Carbon Chemicals Div., UNION CARBIDE AND CARBON CORP., 30 E. 42nd St., New York 17, N. Y.
Circle Inform-A-Gram No. C20.

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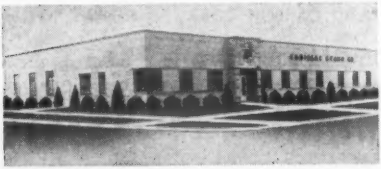
Industry News

Arthur T. Dalton, secretary of Chicago Wheel & Mfg. Co., Chicago, has been appointed to the Advisory Committee, Abrasive Industry of the National Production Authority in Washington, D. C. During World War II he was a representative on the abrasive advisory group of the War Production Board, serving for the duration of that conflict.

Cadillac Stamp Co. is now occupying a new and larger plant at 17315 Ryan Rd., Detroit 12, Mich. The new structure is fitted out with



the most modern equipment and meets the company's expanding needs for increased productive capacity.

Everett K. Morgan is the new general sales manager of the mechanical press line of Danly Machine Specialties, Inc. Mr. Morgan was formerly with Giddings & Lewis Machine Tool Co., of Fond du Lac, Wis., where he served as vice president in charge of sales and manager of engineering.

Carboloy Co., Inc., Detroit, has launched a $2,800,000 plant expansion program to meet rapidly increasing demand under the defense program for tungston carbides in various forms. Of the total, approximately $800,000 is being devoted to expanding the present Carboloy plants on 8-Mile Rd., Detroit, while $2,000,000 is for construction and equipping of a new plant in Edmore, Mich. The Detroit expansion will provide approximately 13,000 square feet of additional production area plus increased facilities for the manufacture and storage of hydrogen, used in the sintering of metallic carbides. Productive area of the Edmore plant, which will have complete tungsten carbide processing facilities, will be approximately 45,000 square feet.

Walter Zimmerman has been named district manager for the Columbia Tool Steel Co. office and warehouse at 2716 Spring Grove Ave., Cincinnati. His territory includes the southern half of Ohio, and the States of Kentucky, Tennessee, Alabama, Florida, Mississippi and Louisiana.

Allied Products Corp., Detroit, has acquired all of the outstanding stock of Michigan Powered Metal Products Co., Inc., of Northville, Mich., and, as a result, the Northville company has become a wholly-owned subsidiary of Allied Products Corp. In the new corporate structure, Ralph Hubbart, Allied's president, will be president of Michigan Powdered Metal Products Co., Inc. Leroy E. O'Dell has been named vice president and will be located in Northville where he will have direct charge of the operation. John Haller, MPMP's former president and founder, will continue to be active in the organization as a vice president. Frank H. Bishop, on the executive staff of Allied as a vice president, is also a vice president of MPMP. W. E. Ray is secretary and J. P. Halm is treasurer.

The Ohio Electric Mfg. Co., Cleveland, has purchased all tools, patents and rights to manufacture the Taylor & Fenn line of drilling machines. Taylor & Fenn Co., located in Hartford, Conn., was established in 1846 and is one of the country's pioneer machine tool builders. Tools, dies and fixtures are being transferred to the Cleveland plant where the equipment will be manufactured.

The Carpenter Steel Co., Reading, Pa., announces the appointments of Norman W. Calkins as manager of tool steel sales, and Harold A. Brossman as manager of alloy steel sales. Both men were elevated from assistant managerships in their respective departments.

An Intensive Training Course in Statistical Quality Control will be conducted by the College of Engineering at the University of Colorado, Boulder, Colo., from June 19-29. The course will include acceptance sampling and other industrial statistical methods used in industry. John F. Wagner, assistant professor of applied mathematics, who will be in charge of the course, states that instructors for the course will be men who have had experience both in the teaching of this technique and in its application in industry and business. Application or further information about the course can be obtained by writing Mr. Wagner in care of the College of Engineering, University of Colorado, Boulder, Colo.

The H. E. Dickerman Mfg. Co. of Springfield, Mass., manufactuer of automatic punch press feeds, has appointed Gullberg Die Supply Co., East Grand Blvd., Detroit, as distributor of its hitch feeds, die feeds and Rol-Di-Feeds, in that area.

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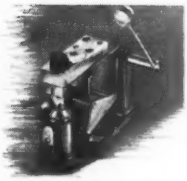

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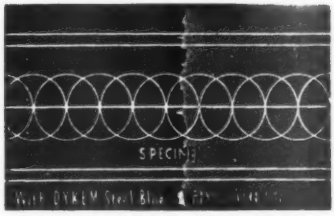

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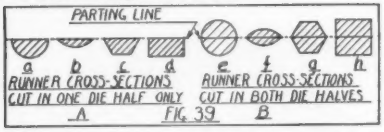

PARTING LINE
a b c d e f g h
RUNNER CROSS-SECTIONS CUT IN ONE DIE HALF ONLY
RUNNER CROSS-SECTIONS CUT IN BOTH DIE HALVES
A
FIG. 39
B

Fig. 39A. Runners of different cross-sectional pattern cut into only one die half. Fig. 39B. Runner of different cross-sectional pattern cut into both die halves.

The cross-section of the runner, if cut in one die half only, may be semicircular or rectangular, as indicated in Figure 39; the latter being most frequently employed. Either method is satisfactory. The rectangular has greater cross-sectional area for the same width.

Whenever the rectangular shaped runner is employed, sufficient draft must, of course, be allowed on the side walls.

Runner Length

Where the length of a runner becomes too long in proportion to the size of the casting (on a weight bases) to which it feeds the molten alloy, the casting may become host to excessive porosity, imcompletely filled portions, cold-shuts, deep-seam lines, etc., due to the fact that the temperature of the molten alloy has decreased through heat loss during its travel through the long runner.

Where, for some reason or other, long runners have to be resorted to. it generally is necessary to provide overflows near the casting so as to make possible the **washing-out**, of the cold metal from the die cavity. This arrangement permits the hotter metal to flow freely into the die cavity and replace the cold metal.

The use of long runners to balance the die thermally is to be discouraged since the use of a blind runner, or more aptly termed a heat runner, will accomplish the desired effect.

The length a runner may be in actual inches, and still perform its function satisfactorily, is dependent upon its cross-sectional area—the optimum length decreases as the cross-sectional area decreases.

In the case of aluminum base alloys, the authors question the utility of any runners longer than 20 times their width.

Influence of the Alloy on Runner Design

The design of a runner, or runner system, must take into account the thermodynamic properties of the alloy which will flow through the runner system, as well as certain other characteristics of the alloy such as its tendency to deposit an oxide film onto the face of the runner cavities, as, for example, in the case of die casting the copper base alloys.

In the case of the more fluid alloys, especialy those of the lower melting point alloys based on lead and/or tin and the zinc base alloys, the runners need not be of quite as large a cross-sectional area as runners which are to transmit alloys of magnesium, brass or aluminum.

Runner Types

The **fishtail** or **fan-type** runner is still used with unjustifiable frequency to feed fairly large die castings. Die castings, of fairly thick sections in which the presence of some porosity may be of little consequence, may be die cast with the aid of the fishtail type of runner with some success. However the ultimate results are inferior when it is employed to feed die castings which are required to have a high strength weight ratio.

Of all types of runners, this is the one most likely to induce and maintain turbulence in the injected molten metal stream, causing porosity and cold shuts. Moreover, this type of runner, along with its feed, usually causes a lack of thermal balance in the die.

The use of the fan-type runner leads to the overheating of local portions of the die cavity face which results in the formation of surface defects — often, called "sinks" in the die casting.

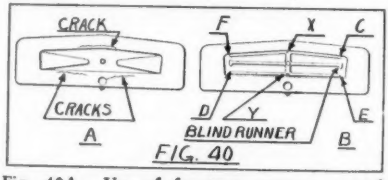
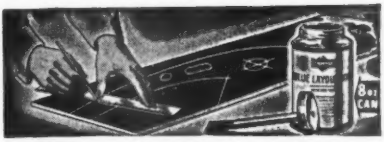


Fig. 40A. Use of fan-type runners caused cracks to appear in this die casting, as shown in diagram. Fig. 40B. Use of straw-type runners eliminated the cracks.



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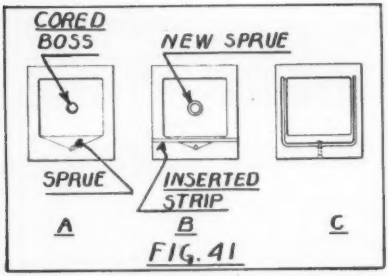

Fig. 41A. Fan-type runner used to feed a flat cover plate die casting. This type of runner produced undesirable defects in the casting. Fig. 41B. Fan-type runner is blocked off and sprue is re-located in the casting center to produce defect-free castings. Fig. 41C. This straw-type runner also produced a casting free of defects that occurred previously.

Figure 40A shows a wringer part which was die cast with an interior feed consisting of two fishtail runners. Their average depth is somewhat greater than the thickness of the casting. When this die was operated at normal temperatures, the die castings produced were subject to either cold shuts or deeply straited flow marks. When the die casting metal temperature was raised, while the die temperature was held at approximately the previous value, the edges of the die casting tore away parallel to and at a little distance from the gate, and cracks developed at the outer corners. Flow marks, though not so pronounced, were still evident at the extremities of the die casting. When the die temperature was also raised in order to get rid of the cracks at the corners, the ejector pins pushed through the die casting on ejection. The provision of extra ejector pins along the edge of the die casting caused the latter to fold up when ejected.

When the die temperature was high and the metal temperature low, the die castings were distorted on ejection and showed cracks consistently near the gates and intermittently at various other places but were host to a fairly good surface finish marred only by occasional sinks. In short, a complete lack of thermal balance was exhibited by this die.

Mr. Barton redesigned the runner system of this die with considerable success. In the case of the new design, the die casting, Figure 40B, was gated along the whole length of two slender cross-runners from F to C and from D to E, the thickness of the gates being slightly increased towards the ends and decreased in the middle. Two small rectangular pegs were located at X and Y. These serve a twofold purpose: (1) to distribute the metal stream; and (2) to anchor the runners in such a way that the shrinkage is mainly taken up between them and the sprue, thus eliminating the cause of the crack which had previously appeared parallel to the gates. Also, two blind runners, enlarged at the ends, which serve to carry extra heat to the extremities of the casting were added. This improved design of Mr. Barton's proved a satisfactory solution of the difficulties previously encountered.

The fan or fishtail type of runner system frequently leads to undesirable consequences: Take the case of the die design shown in Figure 41A. Castings made from this die exhibited cracks which were obviated by redesigning the die in accordance with the design shown in Figure 41B. Here Mr. Barton's cure was ingeniously simple: The old feed was blocked off and a new sprue hole was bored through the cavity forming the central boss, and the core was replaced by a water-cooled sprue plug surrounded by an ejector sleeve. In the event that the cored boss had not been present, Mr. Barton would have redesigned the die in accordance with Figure 41C.

In order to fully appreciate precisely

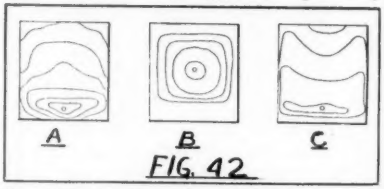

Fig. 42A. Isothermals existing in the cover casting when the runner 41A was used. Fig. 42B. Isothermals existing in the cover casting when the runner 41B was used. Fig. 42C. Isothermals existing in the cover casting when the runner 41C was used.

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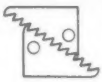

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why the runner system for this die was redesigned in the manner illustrated, it is necessary to consider Figure 42, which shows the isotherms or lines of equal temperature for the three layouts.

In Figure 42A, where the original and unsatisfactory layout is represented, it can be seen that the heat is largely localized around the sprue and runner, and the die is progressively cooler as the distance from the sprue increases. The injected metal stream, by the time it reaches the farther side of the cavity, is extremely sluggish and tends to form a semi-solid skin at places where it contacts the walls. The somewhat warmer metal pressing behind breaks through the skin and in its turn solidifies the juncture of the two showing the random striations or flow marks, which we have previously noted. The extremely swift repetition of this sequence at innumerable points along the advancing edge of the metal stream gives rise to the grainy appearance of the flow marks.

The foregoing applies to all die castings of relatively thin sections such as those under examination. Where castings are of thicker section, the disparity between the heat emitted at various parts of the die is lessened and the metal reaches the extremities of the die cavity in the fully liquid state. If the fishtail runner is used in such cases, the surface finish of the die casting may be quite acceptable but the turbulence induced by the constantly increasing cross-sectional area of the runner will render it extremely porous at the center.

In the diagram in Figure 42B, which shows the thermal distribution in the amended die, the isotherms are roughly concentric, although toward the outer parts of the cavity they begin to approximate to its shape. In this die, however, the distance the metal stream has to travel to reach the farthest points of the casting is less than half of that in the first case. Moreover, the sprue in this case is only a small cylindrical stub and has but little effect on the die temperature. The metal spreads evenly in all

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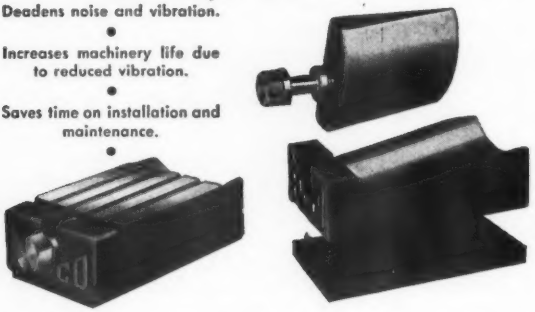

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directions, reaching the edges of the cavity while still hot, and the heat given up to the die at those places is both relatively and absolutely greater than in the previous layout.

The effect of the heat necessarily concentrated in the cored boss is neutralized by the water-cooled sprue bar. It may be noted that had the casting had a somewhat thicker rim or bead around the edge, the die temperature would have been leveled out even more and the die itself would have been correspondingly easier to operate.

In the hypothetical case, Figure 42C, where it is assumed that a similar cover is to be cast without a central boss, the pattern of the isotherms shows at once the effect of the two balanced runners. Although they center upon the sprue, the general effect is to make the cavity temperature much more even, apart from the slight dip which may be noted at the middle of the top edge, and the gradient even there is not sufficient to have an adverse effect upon the surface finish of the castings.

Frequently the fan-type runner is the outgrowth of the straw-type runner. The die is then given a trial run during which it may be found that the die cavity or cavities do not fill with molten metal quickly enough (or what is thought to be quickly enough) and it is decided to increase the gate area by widening the gate or "flaring it out" as it is called. The gate is widened in preference to increasing its thickness because it is felt that an overly thick gate would in turn bring about the occurrence of still more troubles; for example, trimming difficulties, the formation of porosity in the immediate vicinity of the gate, and the reduction of the velocity of the incoming molten metal ray. Thus the gate is widened, and along with it the feed is, of course, widened and finally the runner is correspondingly widened. As we have just shown it is not necessary to resort to the use of fan-type runners merely because it is expeditious to employ a wide gate.

(Continued next month)

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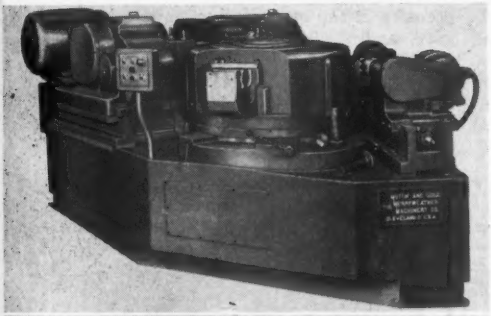

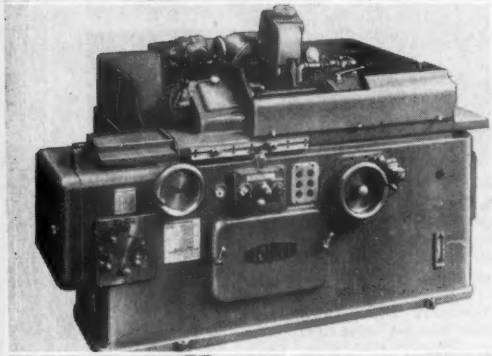

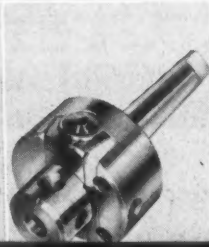

THREE-STATION MILLING AND CENTER DRILLING MACHINES are being marketed by Motch & Merryweather. A range of forgings or shafts from 4" to 16" length can be machined at a production rate of 220-240 pieces per hour with simultaneous operations of milling and center drilling both ends while the operator is unloading and loading. The machine cycle is semi-automatic. THE MOTCH & MERRYWEATHER MACHINERY CO., 715 Penton Bldg., Cleveland 13, Ohio.

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THE NEW "150" SERIES OF GRAHAM DRIVES is designed for lower input speeds (1800 and 1200 rpm without spring loading) than formerly were used. Lower input speeds of these transmissions, which are offered in sizes from ½ to 1½ hp, give cooler, quieter operation with increased efficiency and greater durability in severe, continuous duty applications. GRAHAM TRANSMISSIONS, INC., 3754 N. Holton St., Milwaukee 12, Wis.

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A NEW AIR OPERATED STAKING MACHINE (outside cut) is being manufactured by The High Speed Hammer Co., Inc. This machine is designed for staking or riveting fixed or movable joints, and its adaptability covers such operations as eyeletting, inserting grommets, burring, and pointing with platinum, tungsten or silver. An outstanding feature is "double-action." The spindle is constructed with a pressure pad that compresses or assembles the work prior to staking. THE HIGH SPEED HAMMER CO., INC., 304-A Norton St., Rochester 21, N. Y.

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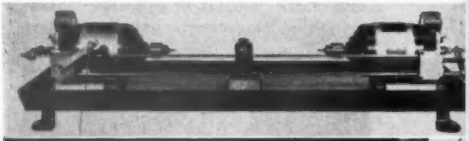

INGERSOLL'S NEW CUTTER VISE holds inserted blade milling cutters firmly in a convenient position while blades are being reset. With the cutter rigidly clamped, wedges can be driven and screws tightened more rapidly. Power-operated jaws of the vise are opened and closed by an air-pressure valve as the operator indexes the cutter. A pointer mounted on the vise is used in setting blades to the same height. THE INGERSOLL MILLING MACHINE CO., 2420 Douglas St., Rockford, Ill.

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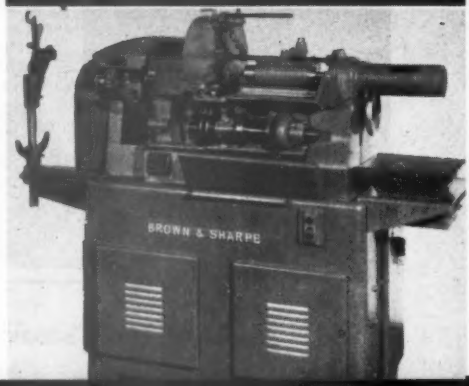
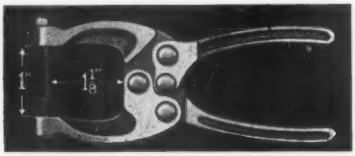


The "De-Sta-Co" Plier-Type Toggle Clamp, No. 424, is particularly suited for aircraft assembly, sheet metal and body work, and for holding parts during machining, welding and cementing operations. It provides positive holding pressure with a firm toggle locking action. Light weight, only 5 oz., makes it



ideal for one-hand use, while extreme compactness allows use in restricted working areas. DETROIT STAMPING CO., 344 Midland Ave., Detroit 3, Mich.

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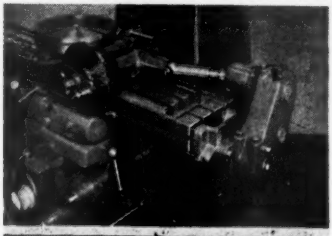

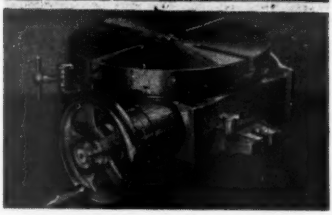

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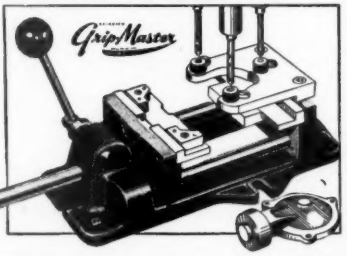

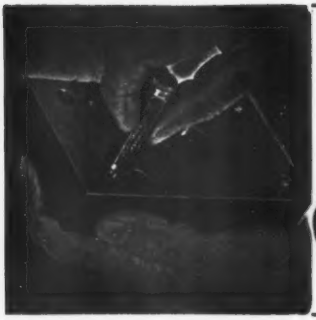

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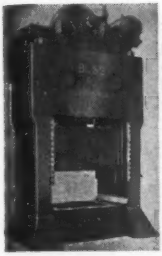

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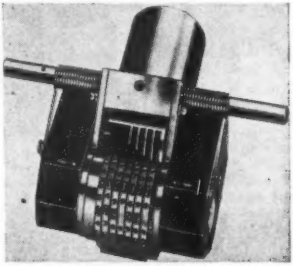

Face Gothic or Shaded Roman, recommended for use on brass or other soft metals. Direct reading is possible on the larger heads, enabling determination of machine settings at a glance from engraved numbers on the front of lettering wheels. THE PARKER STAMP WORKS, INC., Dept. 6, Hartford, Conn.
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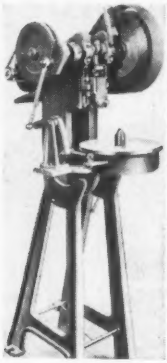
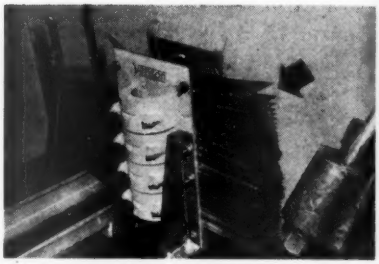


The Speedex 5 Ton Dial Feed Press is being produced by de Castro & Associates. The index feed of this back geared press is a standard model A-12 Speedex, either 10 or 12 station, which assures positive and accurate indexing at each stroke of the press. Standard stroke is 1". This model is also available in 2" stroke. Clutch construction is of the sliding key type, which provides smooth, rapid action., DE CASTRO & ASSOCIATES, 1515 Santa Fe Ave., Los Angeles 21, Calif.

Inform-A-Gram No. A16.

Verson's New Magnetic Sheet Floater eliminates the difficulty in separating sheets of steel for feeding into stamping presses and press brakes. This non-electric, permanent-type plate magnet unit substantially speeds up sheet handling and also reduces glove damage and injury to workers in the form of cuts from sharp sheet edges. Blanks and irregular shapes can also be separated. Descriptive literature containing full information

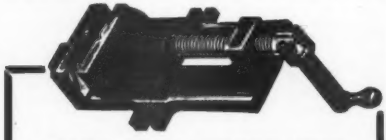


may be obtained by writing to VERSON ALL-STEEL PRESS CO., 9335 S. Kenwood Ave., Chicago 39, Ill.

Circle Inform-A-Gram No. A17.

The Ideal Blo-R-Vac Cleaner is a 3-in-1 combination that gives the operator a vacuum cleaner, a water pick-up and a powerful "hand-type" cleaner or blower. It consists of a 12-gal. rust-resistant tank set on four large caster wheels. IDEAL INDUSTRIES, INC., 5186 Park Ave., Sycamore, Ill.

Inform-A-Gram No. A18.



YOST DRILL PRESS VISE

● This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

OFFERED IN TWO SIZES

Vise No.	Width of Jaw, Inches	Opens Inches	Weight Pounds
1D	3½	4	12½
2D	5	5½	23

Do you need a vise of ANY type?

Write today for bulletin on the extensive Yost line

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1000 MAIN STREET
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$14.75 PPD

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NEW EXCLUSIVE CAMLOCK AND GIB IMPROVEMENT INSTANTLY FIXES SETTING, PREVENTS SHIFTING, GUARANTEES SQUARENESS OF JAWS. THE MAUSER TRADEMARK... IS YOUR PROTECTION.

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UNIVERSAL TAP AND DIE GUIDE FIXTURE

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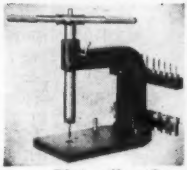
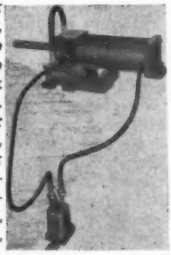
DELIVERY FROM STOCK

$49.75 with 12 tap adapters No. 5 to ⅝"



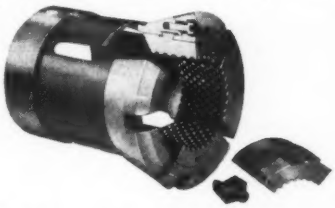
LASSY TOOL CO., Plainville, Conn.

The Com-Port Power Tool, consisting of a power unit and a shear head, provides tons of pressure in a compact, portable unit for shearing bar stock in a matter of seconds. By attaching the shear head to the power unit, the tool can be used for bending, punching, forming, etc. SNELLER MACHINE & TOOL CO., INC., 15002 Woodworth Ave., Cleveland 10, Ohio.



Inform-A-Gram No. A19.

An Improved "Quick Change" Master Collet, in which the pads can be changed without removing the collet from the machine spindle, is announced by Sutton Tool Co. Holding features of the Style "FL" Collet are the replaceable pads that: 1) are securely



locked by a greater holding mechanism to prevent slippage from bar thrust; and 2) are "diamond serrated" to grip work together by holding both horizontal and rotating thrusts at an angle. SUTTON TOOL CO., Dept. TDJ, Sturgis, Mich.

Circle Inform-A-Gram No. A20.

Hauser Type 241 Pivot Polishing Machine incorporates the latest advances in high-precision wet polishing and is basic to the fast and accurate new Hauser Burnishing Method. Burnishing is done by special carbide or ceramic wheels having long life but requiring little redressing. It will polish pivots straight, taper or radius; will polish shoulder at the same time as the cylinder at right angle or bevel; will polish various types of metals. HAUSER MACHINE TOOL CORP., 30 Park Ave., Manhasset, N. Y.

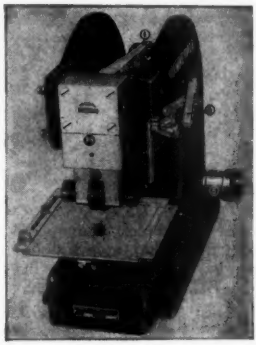
Circle Inform-A-Gram No. A21.

UNIVERSAL
DRILL BUSHINGS
Universal Drill Bushings with superhoned bores have been the first choice of industry since the founder of Universal Engineering Co. originated standard drill bushings nearly 30 years ago. Available in standard and special sizes to speed and simplify your jig drilling at greatly reduced tool breakage costs. Complete stock of standard bushings available for immediate shipment. Write today for complete information.
UNIVERSAL ENGINEERING CO.
FRANKENMUTH 8, MICHIGAN

A Pneumatic Type Impact Wrench, incorporating a completely different and simplified impact mechanism, has been developed by Master Pneumatic Tool Co., Inc. Used for both driving and removing nuts, studs, screws, etc., in all types of assembly and sub-assembly, the new Master Power Model M950 Impact Wrench is rated for ⅜" bolt size capacity on most work. By use of a new type air inlet control valve this one size may be used for many different sizes of work. There are only two impacting parts and the unit does not contain any springs or gears. Impacting takes place only when the nut begins to tighten. MASTER PNEUMATIC TOOL CO., INC., Dept TDJ, Orwell, Ohio.

Circle Inform-A-Gram No. A22.

A Powerful Bench Crank Press has been designed by Numberall for stamping name plates and small parts. The ram head will take type holders, numbering heads and special dies. A tripping attachment can be supplied for use with automatic numbering heads for consecutive numbering. Model 133 (pictured) is operated by a motor through an eccentric having a releasing device, allowing it to stamp once each time the control lever is depressed. It stamps continuously if

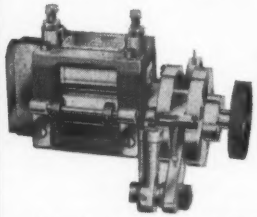


control lever is held down. Model 132 is operated by a 3" air cylinder, and Model 131 is hand operated. NUMBERALL STAMP & TOOL CO., Huguenot Pk., Staten Island 12, N. Y., will provide Bulletin MS-131-56.

Circle Inform-A-Gram No. A23.

"RFC" ROLL-FEEDS

PRECISION FEEDS FOR ALL PRESSES



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Model A Complete

Other Sizes Available

Suitable for 4 Ton, 6 Ton, 8 Ton

POWER PRESSES

• Can't slip • Reverses instantly

• Feeds in thousandths

• Maintains original setting

Complete information on request

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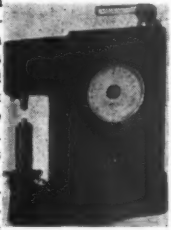
CHICAGO DIES

Complete Line of
PUNCHING and FORMING DIES
for All Sizes and Makes of
PRESS BRAKES

DREIS & KRUMP
MANUFACTURING COMPANY

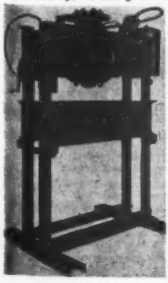
7428 S. Loomis Blvd., Chicago 36, Ill.

Production of Parlec Drill Jigs, started in the last war, has been resumed by Universal Tool Co. These jigs are said to save both designing and tooling time. Toolmaker merely locates part on base, adds side plates if drilling sides, and installs bushings and clamps. Jig is then ready for production. The unit is sturdily constructed of nickel iron and normalized with top, bottom and both sides of jig frame and cover finished. Complete price lists and descriptive literature on Parlec Drill Jigs may be secured from FRANKLIN E. SMITH & ASSOCIATES, National Sales Agents, 6201 Carmelita Ave., Bell, Calif.
Circle Inform-A-Gram No. A24.



A New and Improved Hardness Tester is announced by J. P. Newman Co. This instrument covers the C, B and E Rockwell scales. It features a quick-acting cam handle on top of the machine. A flip of this handle gives the operator instant reading, making the instrument suited for the production line. The weight is eight lbs.; with carrying case, 14 lbs. J. P. NEWMAN CO., 3544 E. Fowler St., Los Angeles 33, Calif.
Circle Inform-A-Gram No. A25.

The Lempco "Elect-draulic" 150 Ton Press is specifically designed for diesel service. This fast and powerful press has a capacity for a variety of shop work and production pressing. It is excellent for riveting, pressing, bending, straightening and broaching heavy assemblies without damage due to excessive tonnage or uncontrolled power surges. A special patented finger-tip control runs the ram down to the work in a hurry and builds pressure rapidly to preselected tonnage. LEMPCO PRODUCTS, INC., 5488 Dunham Rd., Bedford, Ohio., can furnish additional facts.



Inform-A-Gram No. A26.

"BETTER MEASURE WITH LUFKIN"

NEW! CHROME-CLAD
MEZURALL
"10-FOOTER"
TAPE-RULE
No. C-9210

Chrome-Clad Blade
Easier Reading
Longer Wearing
Self-Adjusting Hook
Replaceable Blades

With the new *Mezurall "10-Footer"* Tape-Rule you can save time and insure greater accuracy on all types of shop work beyond the capacity of regular 6- or 8-foot Tape-Rules.
Permanent jet black markings stand out sharply against the patented non-glare chrome white background. Exclusive *Chrome-Clad* satin finish is rust and corrosion resistant—will not chip, crack, peel.
Blade is replaceable—with patented safety catch for easy changing . . . and, no other Tape-Rule has the patented Self-Adjusting End Hook. A "natural" for machine shop use.

Your Industrial Distributor has them...specify No. C-9210 10-ft. Chrome-Clad Mezurall. Also available with nickel plated blade, specify No. 9210.

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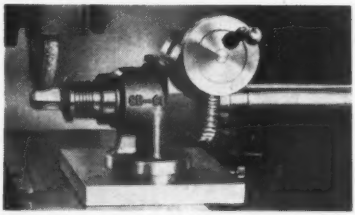
TAPES • RULES
PRECISION
TOOLS
THE LUFKIN RULE CO.

SAGINAW, MICH. • New York City • Barrie, Ontario

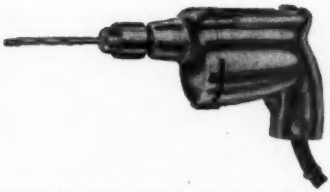
The "DU-ONA-LATHE" is a vertical rotary attachment that permits a lathe to do precision jig boring. It guarantees an absolute 1/10th



of 1 degree accuracy and performs many diversified jobs, including: drilling, reaming, flycutter facing and jig and fixture work. This tool fits 9" South Bend Lathes. ALLAN MFG. CO., 22-76 Steinway St., Long Island City 5, N. Y., will mail descriptive literature upon request.

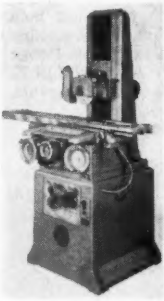
Circle Inform-A-Gram No. A27.

New ¼" Desoutter Portable Electric Drill Gun. Model S2, for general utility work, weighs 2½ lbs., operates at a free speed of 1600 rpm and has a current consumption of only 180 watts. The motor is a high efficiency, powerful universal type for a.c. single phase up to 70 cycles, or d.c. Write for a copy of detailed Bulletin STP-173 to NEWAGE INTER-



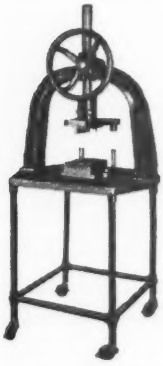
NATIONAL, INC., 235 E. 42nd St., New York 17, N. Y.

Circle Inform-A-Gram No. A28.



Reid Precision Surface Grinder Model 618V features a variable table speed of 12 to 35 ft. per minute. It is designed with the back arm positioned firmly on top of the base, insuring maximum rigidity of the column and elimination of all vibration. Controls protected by a plexiglass cover, are centrally located at the front of the machine. REID BROS. CO., INC., Dept. TDJ, Beverly, Mass.

Inform-A-Gram No. A29.



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Lacey Die-Set Machine

Here's a truly "one man" press. It operates with one hand. Handy for tool and press rooms, it permits the diemaker to complete a die-set right at his bench . . . saves toolroom and handling costs. Ask today for full details.

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New **NESTING TYPE TOTE PANS**

20" Long x 12" Wide x 6¼" Deep 16 Ga., drag holes, handles both ends.

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Specify **ACE DRILL BUSHINGS**

- 3/4 MILLION BUSHINGS IN STOCK is your assurance of prompt service
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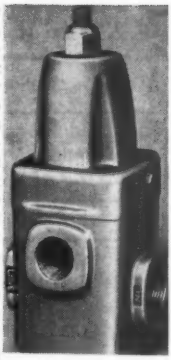

Model 8826 Hydraulic Unloading Valve has been added to the Rivett line. Featuring a Balance Piston design for close, accurate fit in the valve bore, this model is used in oil hydraulic circuits to unload one part of the circuit at no back pressure to the tank. The valve is operated by pilot pressure from some other part of the circuit. Free flow to tank continues as long as the pilot pressure is higher than the setting of the valve. For more data, send for Catalog Section 202. RIVETT LATHE & GRINDER, INC., Dept. TDJ, Brighton, 35, Boston, Mass.

Circle Inform-A-Gram No. A30.

Fulmer Model 415 Honing Machine meets the requirements of those firms who desire to finish longer bores, from ¼" to over 4" dia. This new small machine has a working stroke of 15". It carries a 1¼" diameter heat-treated alloy steel spindle, driven by a 3 hp motor through alloy steel reduction gears, with three spindle speeds available. The spindle and honing tools are hydraulically counterbalanced at all times. C. ALLEN FULMER CO., Dept. TDJ, 1200 1st .Nat'l. Bank Bldg, Cincinnati 2, Ohio.

Inform-A-Gram No. A31.

The Dillon Weight Indicator, an improved model of the Dillon Industrial Scale, is especially useful where long or bulky objects cannot be easily moved to a central weighing point. The dial diameter has been increased to 16", affording closer readings while maintaining portability. A 360° ball-bearing swivel hook is now standard. Accuracy is to within ONE division of the indicated reading. W. C. DILLON & CO., INC., 1421-TD, S. Circle Ave., Forest Park Ill., will provide more details.

Inform-A-Gram No. A32.

SPECIFY KASSON PRECISION COLLETS AND ATTACHMENTS
IMMEDIATE DELIVERY FROM STOCK
3AT, 3C 1A, 4C 5C
480 (AC-50)
All collets in hexagon, square and round.
KLUTCH-KOLLET
Step collet for accurate chucking to 2¾" dia. Soft head for easy boring. Lowest price on market! Models 3AT, 3C, 5C.
FOR ATLAS • LOGAN • SOUTH BEND CRAFTSMAN • SHELDON LATHES, ETC.
LEVER-TYPE DRAWBAR ½" cap.
Positive grip on undersize, oversize or standard diameter work! Patented coordinate cams eliminate fingers.
Let us quote on your quantity orders for any type of collet, live center or other machine tool attachment!
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LIVE CENTER (Ball Bearing) Double sealed for accuracy.
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H & P DIE & STAMPING CO.
13947 Triskett Rd. Cleveland 11, Ohio
PRECISION DIES, JIGS & FIXTURES
Quality Stampings
Bus & Trailer Parts

THE INDUSTRIAL MACHINE CO.
1436 East 47th St., Cleveland, O. Founded in 1908. Builders of Special Machinery. General Machine Work.

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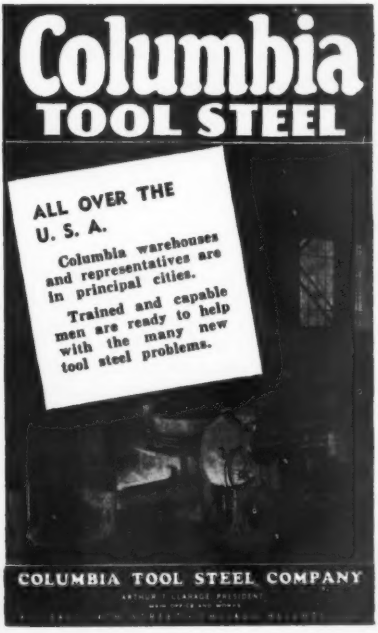
Precision Die Made—Lowest Possible Cost.
DAYTON ROGERS MFG. CO., Minneapolis 7, Minn.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TOOL STEEL
ALL OVER THE U. S. A.
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Trained and capable men are ready to help with the many new tool steel problems.
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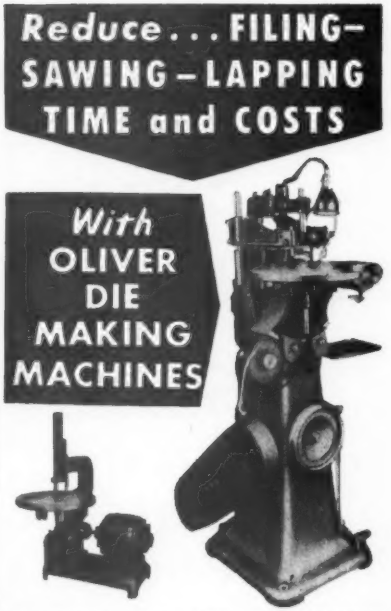

Thousands of OLIVER DIE MAKING MACHINES are in operation in plants throughout the Nation—many of them in continuous use for more than 25 years. Actual case histories prove that OLIVER DIE MAKING MACHINE USERS effect savings up to 60 per cent through their extreme speed and accuracy on all sawing, filing and lapping operations. Important too is the fact that their operation does not require skilled labor.

OLIVER DIE MAKERS *Available in 5 Models*

The Bench Model S-1 (illustrated) is a single speed die maker for use on tool steel up to 1" thick.

The Heavy Duty Model (illustrated) has 6 speeds, works in metal up to 3" thick, has variable strokes to 5" plus hydraulic feed.

Write Today For Complete Technical Data On OLIVER DIE MAKERS

OLIVER INSTRUMENT CO.
1436 E. MAUMEE • ADRIAN, MICHIGAN

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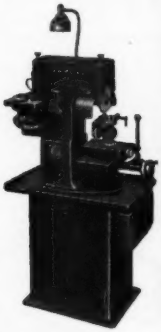
Hammond
OF KALAMAZOO

CARBIDE TOOL
AND
CHIP BREAKER GRINDERS



CB-77 Chip Breaker and Diamond Finishing Grinder

Save
TIME
TOOLS
WHEELS

WD-10 Wet or Dry 10" Carbide Tool Grinder

14-WD Wet or Dry 14" Carbide Tool Grinder

Hammond Carbide Tool Grinders will soon pay for themselves thru greater wheel economy, longer tool life and FASTER grinding. They relieve toolroom bottlenecks and step up production. **Write for Carbide Grinder Catalog.**

Hammond Machinery Builders INC.

1631 DOUGLAS AVENUE • KALAMAZOO 54, MICHIGAN

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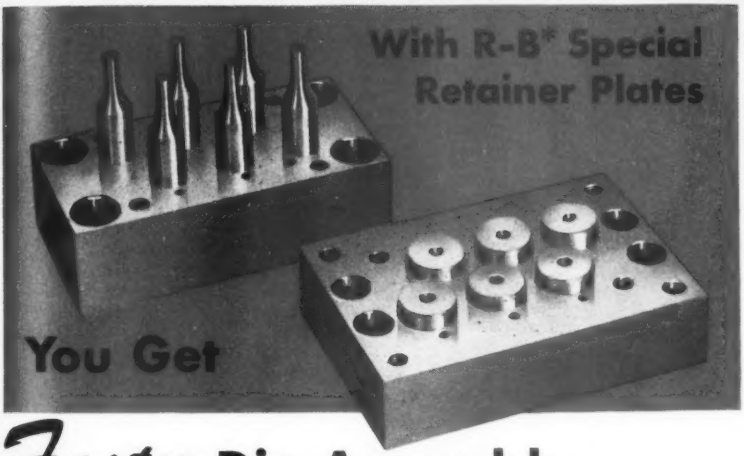

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Closer Hole Spacing

Here's a way to gain all the advantages of R-B interchangeable punches and dies plus additional savings in time and money on die construction. R-B special retainer plates, made to your specifications, eliminate mounting individual retainers—ball retainer locks are built into the plate—thus are ideal for piercing parts with holes too close to permit separate retainers.

R-B special retainer plates are also particularly suited for progressive dies. They can be made in matched units for various punching stations, giving extreme accuracy. The punches or dies are interchangeable, enabling quick changes without time-consuming dis-assembly.

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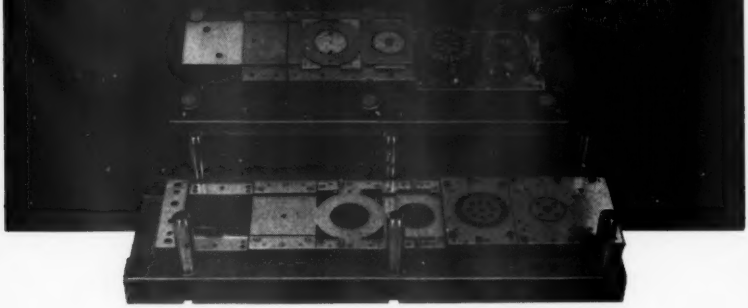
ALLIED PRODUCTS CORPORATION
RICHARD BROTHERS DIVISION

DEPT. 54 • 12635 BURT ROAD • DETROIT 23, MICHIGAN

Also Produced in Allied's Four Plants . . . HARDENED AND PRECISION GROUND PARTS • STANDARD CAP SCREWS • SPECIAL COLD FORGED PARTS • SHEET METAL DIES • ALLITE DIES CAST OF ZINC ALLOY • JIGS • FIXTURES

LAMINATION DIES BY *Lamina*

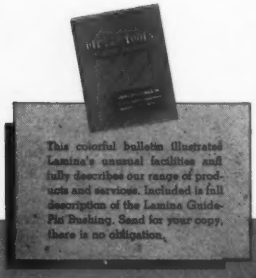


We built our first *Over 5000 Dies Ago!*

As America's largest producer of lamination dies; Lamina has designed and built well over five-thousand of them . . . dies that have proven exceptionally dependable on the presses of leading electric motor manufacturers. Our experience is just as broad in practically every other type of metal stamping die.

This volume of experience is important to you for two reasons: First, it is tangible evidence that Lamina is a consistently dependable source of supply for metal stamping dies. Second, this experience had led to many important advancements in the building and servicing of dies. Such things as the Lamina patented Guide Pin Bushing, bronze plated on hardened steel, which practically eliminates all guide pin service and replacement. Another advancement is the Lamina procedure for grinding dies which increases the number of pieces-per-grind obtainable.

These are a few of the reasons why you get more for your money from Lamina . . . they are reasons few companies ever stop being customers of Lamina. **Lamina Dies & Tools, Inc., 14925 W. Eleven Mile Road, Berkley, Michigan.**



This colorful bulletin illustrates Lamina's unusual facilities and fully describes our range of products and services. Included is full description of the Lamina Guide-Pin Bushing. Send for your copy, there is no obligation.

Lamina DIES AND TOOLS

LAMINA